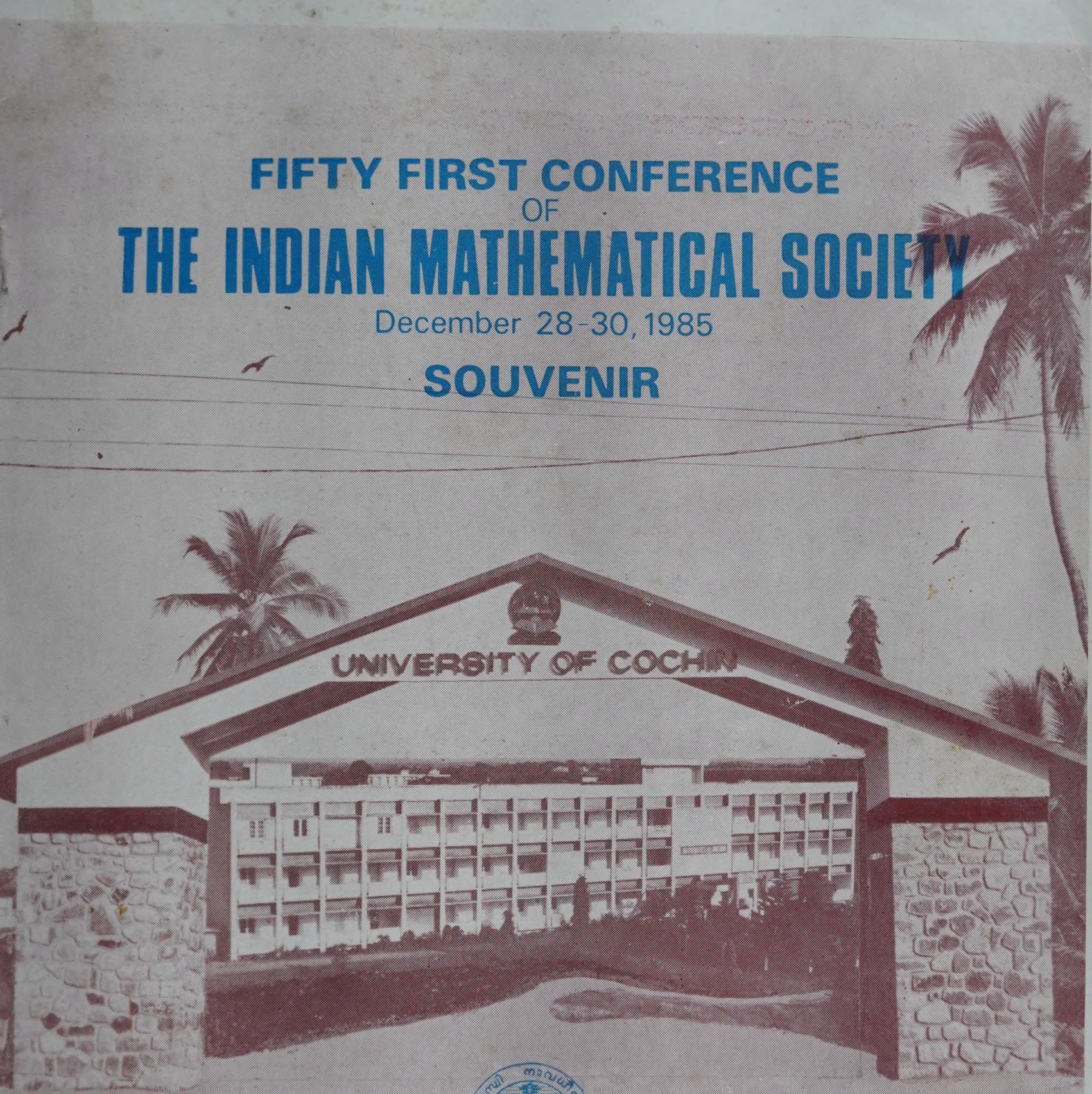
FIFTY FIRST CONFERENCE
OF
THE INDIAN MATHEMATICAL SOCIETY
December 28-30, 1985

SOUVENIR



COCHIN UNIVERSITY

UNIVERSITY OF COCHIN
COCHIN - 682 022

എല്ലാം വിധിയല്ല !

പലരും ജീവിതത്തെ വിധിയുടെ കൈയിലേൽപ്പിക്കുന്നു.
ജീവിത പ്രതിസന്ധികളും വിധിയെന്നു കരുതി സമാശ്വസിക്കുന്നു.

പക്ഷേ !!

വിധിയുടെ വഴിയൊരുക്കുന്നതു് നാം തന്നെയല്ലേ ? നമ്മുടെ
പ്രവർത്തികളല്ലേ നമ്മെ ഉയർച്ചയിലേക്കോ താഴ്ചയിലേക്കോ നയിക്കുന്നതു് ?

ബുദ്ധിപൂർവ്വം ജീവിതത്തെ ആസൂത്രണം ചെയ്താൽ പലപ്പോഴും
ബുദ്ധിമുട്ടുകൾക്കു് സ്ഥാനമുണ്ടാവുകയില്ല.

നിങ്ങളുടെ സുഖകരമായ ജീവിതത്തിനും സുന്ദരമായ ഭാവിക്കുംവേണ്ടി
ഞങ്ങളും ഒരുക്കിയിട്ടുള്ളതെന്തൊക്കെയാണെന്നു് നോക്കൂ !

"ചിട്ടി-ഹയർ പർചെയിസ്-ഭദ്രത"

ഈ പദ്ധതികളും ജീവിതത്തിലുണ്ടാകുന്ന പ്രതിസന്ധികളെ തരണം
ചെയ്യാനും ജീവിത സുഖസൌകര്യങ്ങളും വർദ്ധിപ്പിക്കാനും
നല്ലൊരു ഭാവിജീവിതത്തെ ഉറപ്പുവരുത്താനും ഉതകുന്നതാണു്.

കേരളത്തിലുള്ള 73 ശാഖകളിലൂടെ ജനജീവിതവുമായി നിരന്തരം
ബന്ധപ്പെട്ടുകൊണ്ടിരിക്കുന്ന ഈ പൊതുമേഖലാസ്ഥാപനം
നിങ്ങളുടെ സമ്പാദ്യത്തേയും ജീവിതത്തേയും ഒരുപോലെ സുരക്ഷിതമാക്കുന്നു !

ദി കേരളാസ്റ്റേറ്റ് ഫിനാൻഷ്യൽ എന്റർപ്രൈസസ് ലിമിറ്റഡ്

"ഭദ്രത," മ്യൂസിയം റോഡ്, തൃശൂർ-680 020

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COCHIN-682 022

Dr. B. S. Madhavarao D.Sc.,
F. N. A., F. A. Sc. Associate
Centre for theoretical Studies
Indian Institute of Science
Bangalore

59, Kanakpura Road
Basavangudi P. O.
Bangalore - 560 004

31-10-85

Dear Dr. Thrivikraman,

Having been a contemporary of men like Vaidyanathaswamy, Narasinga Rao, Vijayaraghavan, Meenakshisundaram, Kosambi, Seth, Mahalanobis, U. Sivaraman Nair, B. N. Prasad, Ram Behari, Hansraj Gupta, V. Ganapathy Iyer (some of whom are still with us), and being a teacher of men like K. Venkatachaliengar, V. R. Thiruvenkatachar, K. Ramachandra, S. K. Lakshmana Rao and also of late Harishchandra to whom I taught the theory of group of representations, I have nostalgic memories of many of the Conferences of the Indian Mathematical Society which I have attended.

I specially remember the twentyfifth Conference of 1959 held at Allahabad at which Jawaharlal Nehru was the Chief Guest, and I happened to be the President. The great interest that Nehru showed in Ramanujan, and the searching questions that Nehru asked me about Ramanujan's work was quite revealing to me.

Incidentally, I might mention that December the month in which your conference is being held is also the month in which Ramanujan was born. In fact he was born on 22nd December 1887, and your Conference is being held just two years before the birth centenary of one of the truly great figures in the history of Mathematics. If Ramanujan had any peers in the formal manipulation of infinite series they were only Euler and Jacobi. I remember to have read somewhere Paul Erdos's account of Hardy's personal rating of mathematicians. Suppose that we rate mathematicians on the basis of pure talent in a scale from 0 to 100. Hardy gave himself a score 25, Littlewood 30, Hilbert 80, and Ramanujan 100 ! In abroadcast in Hindi in 1941 Neville said "Srinivasa Ramanujan was a mathematician so great that his name transcends jealousies, the one superlatively great mathematician that India has produced in the last thousand years".

May your Conference be guided by the great love and enthusiasm that this great mathematician had for his subject, and may the Conference be a great success.

Yours Sincerely
B. S. Madhava Rao

V. V. Narlikar

701, Bhaskar,
Colaba Housing Society
Homi Bhabha Road
Bombay - 5

18-9-85

Dear Dr. T. Thrivikraman,

I do not wish to send a separate formal message as desired by you. I have attended the Annual Conference of the Indian Mathematical Society on several occasions in the past—since 1938 when it was held at Lucknow in the presence of (i) Sir R. P. Paranjpye, Senior Wrangler and Vice-Chancellor, Lucknow University and (ii) Shri. G. B. Pant, Chief Minister. U. P. I wish I had the health to undertake to attend the Conference at Cochin on 28, 29, 30 December 1985. May I offer through you my greetings and best wishes to the delegates there at the time of the Conference. All the officers of the I.M.S. and the members of the local committee should have the satisfaction of having organised a successful session with many profitable deliberations. I have just read (Sept 1985) the latest book that deserves the attention of all the delegates, viz., the autobiography of Paul Halmos. That reminds me of my presidential Address. ''Learning Mathematics'', Allahabad 1981, that has not yet been published by the I. M. S.

Yours Sincerly
V. V. Narlikar

V. Ganapathy Iyer

33, Kanakasabhainagar,
Chidambaram-608 001

MESSAGE

As a life member and one privileged to preside over the Golden Jubilee Conference of the Indian Mathematical Society in 1959, I wish all success for the deliberations of the 51st Conference of the Indian Mathematical Society hosted by the University of Cochin.

V. Ganapathy Iyer
22/9/85

Prof. K. Venkatachala Iyengar
Professor of Mathematics
President, IMS [1979-81]

No. 8, 2nd Cross,
Nehru Nagar
Bangalore - 560 020
Telex : 363 888

7-10-85

MESSAGE

Glad to know that the fifty first Conference of the Indian Mathematical Society is being held at Cochin. We recall that Kerala has produced the first Bhaskaracharya, the author of Mahabhaskariya etc, the excellent mathematician Narayana Pundita, Madhava, Parameswara and others. We wish the Conference good success.

K. Venkatachaliger

Prof. M. Venkataraman

C/o. Sri Aurobindo Ashram
Pondicherry 605 002

2-10-85

Dear Prof. Trivikraman,

I am glad to note that the University of Cochin is hosting the 51st Conference of the Indian Mathematical Society: and as a local secretary you are bringing out a Souvenir.

My very best wishes for the same.

India has a rich heritage of Mathematical potential and it is proper task of the Indian Mathematical Society to bring this potentiality into actuality. This can be accelerated on by many useful conferences regional and sectional.

I do hope this year's conference at Cochin will be of great use in this direction by a large number of significant symposia, lectures, paper-presentations and discussions.

Very best wishes for a very useful annual conference of the I. M. S.

Yours Sincerely
M. Venkataraman

Prof. R. S. Mishra
Vice-Chancellor

University of Lucknow
Lucknow

November 2, 1985

MESSAGE

It gives me much pleasure to know that the Indian Mathematical Society is bringing out a Souvenir at the occasion of its Fifty-first Conference. I hope the souvenir will be a befitting tribute for the occasion.

I wish the editors of the souvenir every success in their endeavours.

R. S. Mishra

Prof, U. N. Singh
Member

M. P. Uchcha Shiksha Anudan Ayog
E-2/84, Arera Colony
Bhopal-462 014

November 7, 1985

MESSAGE

Since a national policy on education is on the anvil it will be worthwhile for the 51st annual conference of the Indian Mathematical Society to devote a little time to discussing the present status of mathematical research and education in the country and setting forth its recommendations in respect of strengthening the teaching of mathematics in the Universities. The Indian Mathematical Society, being the premier mathematical society of the country, must present its views to the Union Government regarding the fundamental role played by mathematics in the development of science and technology and the urgent need for revamping mathematical education and research in the country.

I hope there will be a good academic programme and I wish the conference every success.

U. N. Singh

Prof. J. N. Kapur
Ph D., F. N. A. Sc., F. A. Sc.,
FNA, FIMA

Department of Mathematics
Indian Institute of Technology
Kanpur

MESSAGE

The Indian Mathematical Society is one of the oldest scientific societies, not only in India, but in the whole world and it has a glorious history of service to mathematics in India. However, while in the modern academic world, the academic activities of most professional organisations grow exponentially with years, the activities of our Society have almost remained unchanged. It has to increase its activities ten times if it has to play its historical role. During the next five years, it should plan to have an active membership of five thousand mathematical scientists, bring its existing journals, upto date, start a number of new specialised journals, undertake a programme of publication of monographs and advanced books, hold a large number of instructional conferences, seminars and symposia, organise regional conferences and take all steps to make mathematics educarion in India exciting and useful. The Indian Mathematical Society has one great asset and that is the good will and affection of all Indian Mathematical scientists all over the world. I hope the Cochin Conference will find ways and means to channelise this great ethusaism into creative activity so that the land of Aryabhata, Bhaskaracharaya and Ramanujan will once again occupy a leading position in the work of Mathematics.

J. N. Kapur

Prof. R. P. Agarwal
Vice-Chancellor

University of Rajasthan
Jaipur
Rajasthan
24 Sept 1985

Dear Professor Thrivikraman,

It is very gratifying to learn that your University is hosting the 51st Annual Conference of our Society. I am sure that you will have very useful deliberations during your Conference. I wish the Conference every success.

Yours Sincerely
R. P. Agerwal

Dr. V. Krishnamurthy
Deputy Director

Birla Institute of Technology and Science
Pillani (Rajasthan) 333 031
Grams : BITS
Phone : off : 134, Res : 110

September 20, 1985

Dear Dr. Thrivikraman,

I am very happy to note that the 51st Annual Conference of the Indian Mathematical Society is being hosted by the University of Cochin. Throughout my mathematical career I have grown with the Indian Mathematical Society and as one of its past presidents, I join the many who will wish the function a success, as usual, and hope that by our deliberations we can entice more scientists and mathematicians into the fold of the Indian Mathematical Society.

With personal regards,

Yours sincerely
V. Krishnamurthy

P. C. Vaidya

34 Shardanagar
Paldi,
Ahmedabad 380 007

30 September 1985

MESSAGE

I was happy to learn that the 51st Conference of the Indian Mathematical Society is to be held at the University of Cochin during December 1985. I am sorry, I shall not be able to attend the meeting but the loss is entirely mine.

The IMS Conferences have always been a source of encouragement to young and budding mathematicians of our country and I am sure the forthcoming Cochin Conference will be no exception to this general rule. I wish the conference all success.

P. C. Vaidya

BIOSKETCH OF PROFESSOR S.D. CHOPRA

President, Indian Mathematical Society, 1985-86

Professor S. D. Chopra was born at Lahore in a middle class family on December 31, 1917. Except for the first few years, he had all his school and college education at the Dyal Singh High School and Dyal Singh College, Lahore which were run in the best liberal educational traditions with teachers of long standing and high reputation. Prof. Chopra showed an early aptitude in Mathematics as indicated by the fact that when he joined school he could already recite the multiplication tables upto twenty. He has had a brilliant academic record. He always stood first in his school and college and stood first in the B. A. and M. A. examinations at the Panjab University, Lahore. He won numerous prizes, medals and scholarships throughout his academic career He had the opportunity to learn Mathematics with such eminent scholars and inspiring teachers as Pandit Hemraj, principal of his college and Prof. C V H Rao, the then University Professor of Mathematics at Lahore.

After passing his M A. Mathematics examination in 1939, Prof. Chopra served the D.A V. College, Hoshiarpur from 1940-42 as Head of the Mathematics Department, Dyal Singh College, Lahore as lecturer from 1942-47, and the Panjab University Camp College, New Delhi as senior lecturer and Head from 1948-54. In 1954 he went to St. John's College, Cambridge, England for research in Elastic Waves with special reference to Theoretical Seismology for a period of three years under a Govt. of India Scholarship under their Modified Overseas Scholarships Scheme. He earned his Ph. D. Degree in 1957 under the supervision of the Late Dr. E. R. Lapwood, a very distinguished Theoretical Seismologist. While at Cambridge, Prof. Chopra had the opportunity to attend the lecture courses given by such eminent Mathematicians and Physicists as Prof. Sir Harold Jeffreys and Prof. Sir N F. Mott among others.

On return from Cambridge, Prof. Chopra was posted to the Mathematics Department of the Panjab University at Hoshiarpur as lecturer in 1957 and was later promoted Reader when the Department moved to Chandigarh He did a stint as Assistant Professor and Head, Mathematics, at the Regional Engineering College, Srinagar, Kashmir from 1960-61. He joined the Kurukshetra University, Kurukshetra in 1961 as the first Professor and Head of the Mathematics Department when the University became a multi-faculty one and started post - graduate teaching in most subjects. He continued in this position until his retirement on December 31, 1977. During this long peried of over sixteen years he was closely connected with all the academic and executive bodies of the University and contributed his full share to their deliberations. He was also Chief warden from 1970-72 during which period he was also in charge of the extra-curricular activities of the University students.

During his stewardship of the Department, the strength of the teaching staff rose from five to nearly twenty with two dozen research students Teaching and research developed to such an extent that the Department became internationally known in several fields, particularly in Theoretical Seismology, Modern Algebra and Operations Research The standard to which the Department had been raised is also borne out by the fact that the UGC was considering the Department for its programme of special assistance before Prof. Chopra retired.

Even after retirement Prof. Chopra continued to work at the Department of Mathematics, Kurukshetra upto August, 1983 where he continued to carry on and guide research under the UGC Scheme for Outstanding Retired Teachers. During this period he published several papers and two of his students obtained their Ph. D. degrees. Prof. Chopra has been mainly responsible for popularising research in Theoretical Seismology in Northern India. He created a large group of research workers in this field in the Department and ten of them obtained their Ph D degrees under his own supervision : Prof. Chopra was also responsible for the setting up of a Seismological Observatory in the University.

Another achievement of Prof. Chopra has been the setting up of a moderately good Computer Centre at the Kurukshetra University with grants obtained from the Haryana Govt and the UGC, largely due to his efforts.

Prop. Chopra is one of the well-known seismologists of the world. He was invited as a Senior Visiting Fellow in Theoretical Seismology, Royal Observatory, Edinburgh during April-October, 1963 under a grant from the D.S.I.R., U.K just when the International seismological Centre was being set up there. He also visited Czechoslovakia during November 8-29, 1976 under the Indo-Czech Cultural Exchange Programme. During his stay there he addressed the Mathematical Society of Komensky University, Bratislava on 'Mathematical Problems of Seismology' and had the opportunity to discuss current problems in Seismology with the scientists of the Czechoslovak Academy of Sciences, Bratislava and Prague He also had discussions with the members of various Departments of Mathematical Sciences at the Komensky University, Bratislava and the Charles University, Prague. He also obtained first hand knowledge of the structure of scool and university education system in Czechoslovakia.

Prof Chopra has published over twentyfive papers in research journals of internatianal repute and has given several dozen invited research level lectures, addresses and popular talks at various annual conferences and seminars, both in India and abroad. He continues to take active interest in his field.

Prof. Chopra is/has been a member/Fellow of several national and international learned Societies including the Indian Mathematical Society, the National Academy of Science of India, the Indian Science Congress Association, the Royal Astronomical Society London and the Cambridge Philosophical Society, Cambridge. He has also been the Founder and President for first three consecutive years of the Haryana Mathematical Society. He was elected President of the Mathematics Section for the 57th Annual Session of the Indian Science Congress held at Kharagpur in 1970. He was also a member of the Indian Delegation to the Binational Conference on 'Teaching and Research in Mathematics' held at Bangalore in June 1973 under the joint auspices of the UGC, India and the NSF, USA, and of the Indian Delegation to the Asian Regional Seminar on 'Relevance in Science and Mathematics Education' held in Delhi in April 1978 under the joint auspices of the Commonwealth Association for Science and Mathematics Educators, London and the National Research and Training, India.

Prof. Chopra was also a member of the National Sub-Committee for Research in Seismology during the Fifth Five Year Plan.

Prof. Chopra has always taken a keen interest in the development of teaching and research in Mathematics in the country and has served on the Boards of Studies in Mathematics of many universities in India. He was a member of the subject panel in Mathematics for the Board of School Education, Haryana and the Experts

Panel of the N C.E R.T for their text Books for the Junior High School. He was also a member of the Specialists Panel in Mathematics of the UGC during the years 1976-79. A large number of Summer Institutes for the School and College Teachers and at the All India Level for Post-graduates were organised at the Department during his time. Three All India Seminars in Seismology were held under his direction at the Department during 1964, 1971 and 1974 when Dr. E R. Lapwood and Dr. J.A. Hudson of the University of Cambridge were visiting the Department It was due to his encourgement that two All India Seminars were also held in the subject of Algebra in 1967 and 1975, under the directorship of Dr. I.B. S. Passi. A fourth All India Seminar in Seismology was planned to be held during December 1977 as a fitting farewell to Prof Chopra but could be held only in April 1978 after his retirement.

Prof. Chopra has written several text books for college students He was the Chief Editor of the Haryana School Board Text Books for the Matriculation Examination. He has also written the Class VIII Mathematics book in Hindi for the Haryana Education Department according to new syllabi. Prof. Chopra has written the Geometry portions of the N.C E.R T. text books for classes VI-VIII and also edited Part I of the class VIII book All these books bear the stamp of Prof. Chopra s clarity of thinking and exposition.

Those who have had the privilege of coming into contact with Prof Chopra both as students and as colleagues, recall that he is an excellent teacher with clear ideas of the subject and lucid exposition. He has taught many branches of both Pure and Applied Mathematics from the undergraduate to the M Phil. level, with over 40 years of experience of teaching the post-graduate classes. His relations with all categories of his students and colleagues have been very cordial, and his advice, encouragement and help has readily been available to them in their academic and personal difficulties. He can justly feel proud of his having taught Profs. R. P. Bambah and A. Salam at the Panjab University at Lahore. Many of his students are occupying the higest positions both in the academic and executive spheres.

The Mathematical Association of India conferred its' Distinguished Service Award' for 1981 on Prof Chopra for his outstanding service to Mathematics Education and Research in India.

The Indian Mathematical Society: Past, Present and Future

M. K. SINGAL
Meerut University, Meerut

The Indian Mathematical Society was founded in 1907 by the late Mr V. Ramaswami Aiyer with the enthusiastic support and co-operation of several friends including Professor M. T. Naraniengar, Professor T. R. Venkataswamy Naidu, Professor R. N. Apte, Professor K. J. Sanjana, Professor B. Hanumantha Rao, Professor D. D. Kapadia and several others.

It was in December 1906 that Prof. V. Ramaswami Aiyer wrote letters to several of his friends and others, appealing them to join and form a Mathematical Club. He suggested that the Club be called the 'Analytic Club' and that the object of the Club be "the promotion of Mathematical Study and Research." The letter was favourably received and within a short span of three months it was found possible to form the Analytic Club with twenty Foundation members with its Headquarters at Poona. The formation of the club was announced in the newspapers on the 4th April 1907. This was the formal beginning of our Society, the first of its kind in the whole of India. With the mutual consent of the twenty foundation members, Shri. Ramaswami Aiyer acted as the provisional Secretary of the Club and prepared a draft constitution which was announced to the members in a circular dated the 26th May 1907. By this constitution the name of the Society was changed from the 'Analytical Club' to the 'Indian Mathematical Club' as the former name did not appeal to many members. By the same constitution the Hon'ble Professor R. P. Paranjpye, the first Indian Senior Wrangler, was appointed as Honorary member and the Committee of the Society was formed, consisting of the following Foundation members:

1.	Prof. B. Hanumantha Rao,	President
2.	Prof K. J. Sanjana,	Hony. Treasurer
3.	Prof. R. P. Paranjpye,	Hony. Librarian
4.	Prof. M. T. Naraniengar	Joint Hony. Secretaries
5.	Mr. V. Ramaswami Aiyer	
6.	Mr R. Ramachandra Rao	Additional Members
7.	Prof. T. R. Venkataswami Naidu	
8.	Prof. R. N. Apte	

Due to the untiring efforts of the Founder of the Society, the strength of the society rose rapidly. By the first of September 1907 when the first Progress Report was published, the strength rose to 44. On the 15 th of October 1907, when the second Progress Report was printed, the strength of the Society became 52. By September 1908, definite steps were taken to publish a Journal of the Society. The revised constitution and rules received the assent of the General Body on December 1910 according to which the name of the Society was changed from the Indian Mathematical Club to its present name, the Indian Mathematical Society.

The first Conference of the Society was held at the presidency College Buildings, Madras on the 27th, 28th and 29th of December 1916. It was attended by about 70 members. The second conference of the Society was held in Bombay on the 11th, 12th and 13th January 1919. It marked the beginning of biennial conferences of the Society

The Society completed the first twenty-five years of its existence in 1932 and held its 8th Conference and Silver Jubilee Celebrations in Bombay in December 1932. The 1933 Jubilee Memoral volume contains the account of the Bombay Conference and Jubilee Celebrations. The Society continued to hold its conferences every two years till 1951 when it was decided to hold the conferences annually.

The Golden Jubilee Session was held in Pune, the first Headquarters of the Society, from December 31, 1958 to January 3, 1959. To Mark the Golden Jubilee Session the 24th Conference was held for four days instead of the usual three, and a Golden Jubilee Volume was also brought out. The 25th Conference of the Society, which was held at Allahabad in December 1959, had the singular distinction of being inaugurated by Pandit Jawahar Lal Nehru, the first Prime Minister of India.

LIBRARY

The Library of the Society was started in 1907 at Fergusson College,Poona with Dr.R. P. Paranjpye as the first Librarian of the Society who served in this capacity from 1907 to 1922. Professor R. P. Paranjpye was succeeded by professor V. B. Nayak (1922-1936), professor R. P. Shintre (1936-1944), and Professor D. D. Kosambi (1944-1950) In 1950 the Library was shifted to Madras and was housed in the Ramanujan Institute for Advanced Study in Mathematics where it continues to be located at present. Prof. T. Vijayarghavan served as the Librarian of the Society during the years 1950 to 1955. He was succeeded by Professor C. T. Rajagopal in 1955. At present the Library is under the care of Professor T. S. Bhanu Murthy, Director, Ramanujan Institute of Advanced Study in Mathematics, who took charge of the Library when professor Rajagopal was snatched away from us by the cruel hands of death.

PERIODICALS

The Society publishes two periodicals - The Journal of the Indian Mathematical Society and the Mathematics Student.

THE JOURNAL OF THE INDIAN MATHEMATICAL SOCIETY (JIMS)

The Society published its first Progrees Report on the 1st of September 1907 and the second progress Report on the 15th of October 1907.In March 1908 a sub-committee was appointed to take steps for publication of a Journal. By December 1908 the Society had published eight Progress Reports. The first pamphlet under the title 'The Journal of the Indian Mathematical Club' appeared in February 1909 and since then the Journal appeared regularly every two months till 1933. At the time of the Silver Jubilee of the Society it was decided to start the publication of two periodicals. As a result thereof the JIMS new series were started in 1934 and it was turned into a Quarterly Journal.

The Founder-Editor of the Journal was Professor M. T. Naraniengar who continued till 1927 and nurtured it for 20 years. The next Editor was Professor R. Vaidyanathaswamy who served the Society as Editor of JIMS from 1927 to 1950. It was due to the hard work put in by the first two editors that the JIMS established itself as one of the leading international research journals, a position which it continues to have even today. The subsequent editors were Prof. K. Chandrasekaran, Professor S. M. Shah, Prof. R. P. Bambah and Prof. P. L. Bhatnagar, Prof. J. N. Kapur and Prof. M. Venkataraman, and Prof. K. G. Ramanathan. The present editor is Prof. I. B. S. Passi who took charge as editor of JIMS in July 1985.

THE MATHEMATICS STUDENT

At the time of the Silver Jubilee Clebrations of the Society it was decided to start the publication of another periodical and accordingly the Society started a new Journal, The Mathematics Student, in 1933 with Dr. A Narasinga Rao as its first editor. For many years the Mathematics Student used to contain book reviews, announcements, news, notices, problems and solutions, reports of conference of the Society, activities of student Associations in colleges and Universities and other materials calculated to promote the teaching of mathematics such as class-room notes. It used to serve the student community by its critical treatment of college and university mathematics. Undergraduate students and beginning research scholars also used to contribute to it. Among the contributors to the problem section, special mention may be made of Prof. A. A Krishnaswami Iyengar, Prof M. T. Naraniengar, Prof. K. Satyanarayana and Shri D. R. Kaprekar. Dr. A. Narasinga Rao worked as the editor almost single handed and with great devotion for 18 years (1933-1950) and placed it on a firm footing. Prof. A. Narasinga Rao

was succeeded by Prof. C. N. Srinivasiengar (1950-1953).Prof. K. Chandrasekaran (1953-1958), Prof. S. M. Shah (1958), Prof. R. P. Bambah and Prof. P. L. Bhatnagar (1959-1962) Prof, J. N. Kapur and Prof. M. Venkata Raman (1963-1970), Prof. M. K. Singal (1971-1976), Prof I. S. Luthar (1977-1980), and Prof N. Sankaran, the present editor. Over the years the character of the STUDENT has changed and it has turned almost completely into a research journal Many members have pointed out to the need of restoring its former character. It is hoped that in the years to come the STUDENT willonce again start catering to the needs of students and teachers.

A. NARASINGA RAO MEDAL

On the occasion of the 12th Conference of the Indian Mathemalical Society held at Aligarh Muslim University, Dr A. Narasinga Rao, Professor of Mathematics, Annamalai University, Instituted an Award for encouraging research. The award consists of medal to be presented annually to the author of the best paper published either in the JOURNAL or in the STUDENT. In order to be eligible for the award, the author must be below the age of thirty. Unfortunately the Award has not been made for the past several years. Efforts are being made to award the medal for the years for which it has not been awarded yet.

RECIPROCITY AGREEMENTS

The society has a Reciprocity Agreement with the American Mathematical society under which a member of either organisation would be eligible for membership in the other organisation and would be admitted to themembership at his request. He would then pay the usual full dues to one organisation and half dues to the other organisation. The society has also entered into similar Reciprocity Agreements with the London Mathematical society and the Australian Mathematical Society.

SOME SUGGESTIONS

At present the only activities of the Society are to maintain a library, to publish two periodicals and to hold its annual conferences

It is a pitty that the Society should have only 500 members. For a country of our size, with more than a hundred universities, and about two thousand colleges, the Society should have a membership of at least five thousand.

The Society does not have a permanent office, the periodicals are not being published in time and much is left wanting in the way of organising conferences. All this is partly due to lack of funds and partly due to lack of enthusiasm, imagination, and drive in the office-bearers.

If the Society has to be the care-taker and promoter of mathematical education and research in the country, it must be thoroughly revamped. A permanent office should be established, the publications should be brought upto date, a vigorus membership drive should he launched, and all the year round activities should be undertaken. Branches of the Society should be set up in various part of the country, instructional conferences should be organised, mathematical olympiads should be conducted, and a publication programme of research/survey monographs should be undertaken and executed on a big scale.

The Society had a rather bad time during the past few years, specially during the years 1981 to 1984, but slowly the signs of recovery and resurgence are showing and it is hoped that in the years to came, the Society will not only regain its past glory but will march ahead to become one of the most prosperous and active society of the world.

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THE NEED TO IMPROVE THE TEACHING OF SCIENCE AND TECHNOLOGY *

The world of today is largely the product of developments that have taken place in the field of science & technology. Pandit Jawaharlal Nehru once said: "It is science alone that can solve the problems of hunger and poverty. The future belongs to science and to those who make friends with science". Many countries have been able to raise their standards of living through massive investments in science & technology. Several scholarly investigations by planners and social scientists have shown the close correlation between investments in science & technology and the development of a country as judged by the GNP. No wonder that the Scientific Policy Resolution of the Government of India adopted on March 4, 1958 declared India's determination to harness science for people's welfare and 'to participate fully in the march of science, which is probably mankind's greatest enterprise today' In a science-based world, science & technology has to be an integral part of all our activities. It has to be established as a live and vital force in our society. This can be done only by improving the teaching of science & technology at all levels.

Our country is singularly fortunate that it had national leaders who reflected a profound commitment to science & technology. It was only after independence, and through the vision and whole-hearted support of our first Prime Minister, Jawaharlal Nehru, that science & technology was developed in a conscious way as a major force for social and economic change. Indian science-which today has a very large base encompassing almost every conceivable field—has been fortunate in the support it has enjoyed at the highest political level ever since independence. Even today all Departments relating to science & technology are under the direct responsibility of the Prime Minister of India.

The past 38 years of independence have been years of vigour and growth for science & technology in India. Special mention should be made of the indefatigable sponsorship given by the late Indira Gandhi during the 16 years of her Prime Ministership, which gave a new vision and momentum to scientific enterprise in India, which reached out to new horizons from the space to the oceans. Notable achievements in space and missions to the Antarctica not only placed India in the forefront of international science, but also provided the much-needed sense of achievement and encouragement to Indian scientists.

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* (Talk by Dr. K. Gopalan, Vice-Chancellor, University of Cochin delivered over the Trichur Station of the All India Radio on July 20, 1985)

കേരളത്തിലെ വ്യവസായവൽക്കരണത്തിൽ വെയർഹൗസിംഗ് കോർപ്പറേഷൻ മുൻപന്തിയിൽ

രാജ്യത്തുടനീളം സുസജ്ജമായ 70 ഓളം ശാസ്ത്രീയ സംഭരണ ശാലകൾ. കാർഷികോൽപ്പന്നങ്ങളുടേയും വ്യാവസായികോൽപ്പന്നങ്ങളുടേയും, ഷിപ്പിംഗ് ക്ലിയറൻസ്, റെയിൽവേ ക്ലിയറൻസ്, ട്രാൻസ്പോർട്ടേഷൻ, സസ്യസംരക്ഷണ പ്രവർത്തനങ്ങൾ, കീടനശീകരണ പ്രവർത്തനങ്ങൾ എന്നിവയും കോർപ്പറേഷൻ ഏറെറടുത്ത് നടത്തി വരുന്നു.

കാർഷികോൽപ്പന്നങ്ങൾ, വ്യാവസായികോൽപ്പന്നങ്ങൾ, എന്നിവ സൂക്ഷിക്കുന്നതിന് ഒന്നര ലക്ഷത്തിലേറെ മെട്രിക് ടൺ സൂക്ഷിപ്പു സൗകര്യങ്ങൾ.

ഗവൺമെൻറ് സ്ഥാപനങ്ങൾക്കും പൊതുമേഖലാ സ്ഥാപനങ്ങൾക്കും പ്രത്യേക പരിഗണനകൾ.

അരി, സസ്യഎണ്ണ, സിമൻറ് എന്നീ അവശ്യസാധനങ്ങളുടെ വിതരണവും ഈ സ്ഥാപനം ഏറെറടുത്തു നടത്തി വരുന്നു.

കേരളാ സംസ്ഥാന വെയർഹൗസിംഗ് കോർപ്പറേഷൻ

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But, while the country as a whole has progressed a great deal since indepedence, the majority of our people continue to be among the poorest in the world. While science has certainly made its impact on small sections of the common people in urban areas, it is yet to permeate the whole of our national life. For the 75% of our population living in our villages, science is a remote entity, alien to the world which surrounds them and of which they are unable to imagine either the purpose or the effect Even today the science & technology content in the Indian society and the extent of India's involvement in research & development are very low. The VII plan approach paper has rightly recorded the fact that the potential of science & technology to contribute to the development effort has not been adequately realised, much less harnessed effectively. Because of financial constraints and also because of a certain lack of interest, the State Governments have been much less supportive of science and technology efforts than the Central Government. The VI Plan allocation for science & technology in the State sector was only Rs. 37 crores or 0.07% of the outlay, while in the Central sector it was Rs. 2003 crores or 3.47%. It is evident that the capacity for generating technology within the country has to be strengthened considerably and vigorous steps taken for the continual improvement of that capacity. The quality and quantity of R&D in a society depends upon the quality and quantity of scientific and technical manpower engaged in it The oft-quoted statement that India has the third largest stock of scientific and technical manpower is highly mis-leading. The truth is: the total stock of India's scientific and technical manpower is quite small relative to her population and corresponding national needs; this stock has to grow at a faster rate-particularly in quality—during the coming decades. This stupendous task has to be done by our universities and colleges.

But, what is the present status of teaching science & technology in our universities and colleges? It is dismal. The universities are supposed to be responsible for producing scientic and technical manpower at all levels and some of the best research in the country is still carried out in the universities. But there is tremendous disparity in the funding of scientific agencies on the one hand and educational institutions carrying out scientific work on the other. Consequently most university laboratories are ill-equipped. Even valuable equipments are not maintained and put to use. There are no spare parts. There are no trained instrument mechanics or technicians There are no well-equipped workshops for fabrication of equipment. There is no provision for research programmes in the maintenance budgets of most State Universities. According to a recent report of the University Grants Commission, out of the 2400 colleges offering science coures in the country, only about 200 have adequate laboratory facilities. This is indeed an awful situation.

The Indian Nobel Laureate Sir C. V. Raman, who was a university teacher, said: "There is only one solution for India's economic problems and that is science, and more science, and still more science." Teaching of science should be integrated with research. Research without teaching has as much or as little a force as teaching without research. Research generates an atmosphere of learning and makes teaching dynamic, creative and up-to-date Teaching and research are interdependent They fertilise each other Let it be remembered that almost all the great names in science: Meghnad Saha, J. C. Bose, Bohr, Fermi, Landau, Rutherford, Blackett etc were great teachers. In advanced countries, the expenditure on university research constitutes about 50% of the total expenditure on education. In India, it is negligibily small. The poverty culture that has developed in the academic institutions in the country, if not checked, will undoubtedly have a damaging effect on the quality of our scientific effort in the long run. While the developed countries are spending about 6-8% of the GNP on education, India is spending only about 3% of the GNP.

In the field of University education, the low investment for research speaks volumes for the deficiency in science and techno-

logy. In respect of science education at all stages, the main constraints have been finance and expertise, which persist because the governments are yet to realise and recognise the importance of education as the basic activity that helps in building the foundations for long-term development. The shortcomings, superimposed on the background of the feeble development of the scientific temper, explain why, despite a large number of scientists and scientific institutions, India has been unable to make much headway in the area of science and technology. Except in specific mission-oriented areas in atomic energy, space, defence and in some fields of agricultural and medical research, the overall impact has been very limited. A meaningful National Science Policy has to start with strengthening the area of science education at all levels. If the above indicated statistics and relationships have any significance, then our national investment in scientific and technical education must increase many-fold to meet the growing needs of our social system.

Under the able leadership of our young Prime Minister Rajiv Gandhi, India is now preparing to enter the 21st century through hi-science and hi-technology. 'A clear recognition of the value of science and technology and a quest for excellence at all levels of policy making have now emerged. Let us hope that those who are responisble for formulating our new national policies will remember that all science originates and grows in universities. Universities produce the scientists and technologists required by the country. There is so much of potential and expertise in our universities. With little more of attention and care, they can be made to make great contributions to the development of the country. The need to improve the teaching of science and technology in our universities is obvious.

THE ART AND SCIENCE OF MANAGEMENT

DR. M. V. PYLEE, MA., D.LITT., LLM. (Harvard) *
Former Vice-Chancellor, University of Cochin.

During the last few decades there have been systematic observation and study of managers, good, bad and indifferent in countries with an advanced industrial system. Such studies have established the fundamentals of good human relations in a modern society with its accent on human dignity, individual liberty and the urge for security. They have made a significant contribution to this complex subject and have indeed enriched our understanding in this field immensely broader and deeper. The conclusion to which they lead us is that in spite of all the emphasis on scientific method and the increasing application of these by good managers to achieve better performance, management still remains more an art than a science. This is because the skills and aptitudes possessed by individual managers are their own and are highly personalized blendings of imagination, creativity and insight.

Consciously or unconsciously, the good managers are generally humble with their power and treat each of their subordinates and colleagues as an individual. They recognize the desire of every one in their organization to belong to a group and they try to make that group one that has the interest of the organizations objectives at heart. The good manager is honest; he fights for the rights of his colleagues and co-workers; he delegates authority and trains his subordinates; he does not try to pass the blame on to others; he keeps his promises; he gives credit generously and reproves in private; he offers by his example security and opportunity to those who work under him.

While good human relations are a sine qua non of good management and the practising of good human relations is an art calling great qualities of head and heart, there are other ingredients which make it a science as well. The scientific aspect of management has been recognized in recent years as increasingly important as the application of scientific methods in solving more and more managerial problems has become widespread. There are, in fact, many management theorists in advanced countries today who look upon management more as a science than an art. They even call management as management science. Among

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DEPARTMENT OF PUBLIC RELATIONS, GOVERNMENT OF KERALA

the more important elements of scientific management are planning, organizing directing and controlling and the various techniques which have been developed in recent years to make their operation more systematic and therefore more effective.

Managemet as a profession

Managing, supervising or influencing the behaviour of others is one of the oldest activities known to man. The art of managing has been getting steadily refind in successive periods of human civilization. Today management has also a well-recognized scientific content. And yet it has not been widely accepted as a profession as law, medicine or engineering. Professional management is a term which is increasingly used in the context of the management of industrial or business organizations but management as a profession has not wide acceptance nor has it the same basis as other professions such as an academic degree, a test or a license. In spite of this there is increasing acceptance of management as a profession.

According to the American Management Association, a powerful nationwide organization in the United States, management is a valid profession since it meets the following five basic qualifications;

1. It has a body of knowledge that is transferable. There are basic principles of management which can be identified, mastered and practised.

2. It follows a scientific approach. There are prescribed patterns for management action and leadership.

3. It involves specific skills and tools. These become the manager's tool-kit or the resources which he uses to cary out his duties and responsibilities.

4. It adheres to a code of ethics. Enlightened professional management responds conscientiously, to accepted attitudes, philosophies and creeds.

5. It has a required discipline. As in the case of other professional careers, managing requires a discipline for effective performance.

Management is a profession in that managers like lawyers, engineers or doctors must be lifelong students keeping abreast of the latest developments and techniques in their professional area. A manager who does not care to do this will soon get outdated and will find it difficult to successfully meet the challenges of his profession.

The American Management Association, celebrating forty years of its meritorious service in 1963, made the following significant statement:

"As an institution, an activity, a philosophy, an art, management is so indispensable to our society that it is all the more astonishing that our concepts were practically unintelligible prior to World War I. Management, however, is more than a human institution. It is rapidly evolving as a true profession, with definable principles and with a body or references, points strong enough to differentiate managers from non-managers and to correlate basic goals for its members, regardless of the nature of their business, their geographical location or the activity with which they are affiliated".

The separation of ownership from management, a distinguishing feature of modern business organization, the rapidly growing public sector enterprises, the increasing complexity of the socio-economic business environment, the greater role of institutions of management education in developing a systematic body of management knowledge and the imparting of training to ever growing numbers of young people, all these have contributed substantially for the development of managemenr as a profession.

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Professionalism in management requires the acceptance of those attitudes and practices that hold the greatest potential for both the individual and the group. And this involves a concept of excellence based on truly high standards of performance. This concept, once identified and clarified, must be understood by everyone involved and accepted as the foundation for managerial action.

Today we live in a world of rapid change, rising costs, a variety of social responsibilities, the growing need for the technical sophistication and the increasing complexity of the operating environment. It brings almost unbelievable demands on both managers and management. It is doubtful whether any other profession is more constantly challenged than management to be informed, to make the right response in a changing world and to manage effectively in a complex and often competitive environment.

Management's role in a changing society must at all times be dynamic. It has to adjust and adapt constantly to suit the demands of differing social, political and economic conditions. The role, the skills, the abilities, the knowledge requirements and the techniques of management will also be continually changing under the influence of such conditions.

ABOUT THE UNIVERSITY OF COCHIN

The UNIVERSITY OF COCHIN was established in July 1971 by an Act of the Kerala State Legislature. "Development of higher education with particular emphasis on postgraduate studies and research in applied sciences, techonology, industry and commerce" is the basic concern of the University as enshrined in the preamble of the Cochin University Act. The University is thus conceived as a Science & Technology University. Most of the Departments/ Schools of study and research started subsequent to its establishment are in the fields of applied sciences, engineering and technology.

Unlike most other Universities which are of the affiliating type, the University of Cochin is cast in a different mould. It is of a federal type. Unique in its structure, methods and goals, the University is rooted in a philosophy of training and research that emphasises the intimate relationship between knowledge and its application, between the University and the community, and seeks to promote the creation of a technological society.

The science, Engineering and Technology Departments of the University keep close liaison with R & D organisations and industry. Postgraduate students spend a semester, partly or fully, in such organisations to complete their project work.

The major Science and Technology Departments/Schools of the University are:- Applied Chemistry, Computer Science, Electronics, Industrial Fisheries, Marine Sciences, Mathematics & Statistics, Physics, Polymer Science & Rubber Technology, Ship Technology, Enviornmental Sciences. Management Studies, Applied Economics and School of Technology. Apart from these, the University has Centres for Microprocessor Research, National Manpower Information, Sponsored Research and Consultancy, Training Services, Information Science and Science Instrumentation. Foreign languages, Hindi and Law are the other Departments in the University.

The University of Cochin has already developed a distinct and unique cultute of training highly qualified scientific and technical manpower at advanced levels, generally outside the educational efforts of other institutions in the State. Plans have been worked out to further consolidate the existing Departments and Schools and to establish new Centres of Research in some of the frontier and emerging areas of Science and Technology.

DEPARTMENT OF MATHEMATICS AND STATISTICS

The Department of Mathematics and Statistics of the University of Cochin was established in November 1976 with the major objective of developing into a centre of excellence in this region in mathematics, statistics and their applications and to provide facilities for training, study and research in these areas.

A four semester M.Sc. programme in Mathematics was started in 1977. In 1979, a two-semester post graduate Diploma course in Operations Research and Computer Applications was introduced. In 1980, an M.Sc. programme in Statistics was begun and from this year on, the Diploma course is replaced by a four semester M.Sc. programme in Operations Research and Computer Applications. These courses are so designed as to give intensive training to the students in the respective areas leading them into original thinking and research unlike what is usually found in conventional teaching. The students of each of these courses are to take up a project work spread over two semesters in some particular topics of their interest, give seminar talks on these and finally submit dissertations based on the work that they have done.

The teaching staff strength has grown from 3 during the fifth plan period to 15 now. The Departmental Library has about 3000 books, back volumes of about 40 journals and about 40 current journals. In addition to this, there is a well equipped Central Library of the University catering to the needs of the Department. The Department is currently in the process of setting up a computer laboratory to provide computing facilities to the students, research scholars aud teachers. We have, as a first step, procured two microprocessors—one 8 bit machine with 64 KB capacity and one 16 bit machine with 256 KB capacity and supporting equipment. The additional computational needs of the Department are currently met by the help and courtesy of the Departments of Electronics and Computer Science.

The Ph.D programme has been a major activity throughout. Eight researeh scholars were enrolled in the very beginning, and at the moment 8 full time and 4 part time research scholars are working for their Ph.D at various stages of their work. The following eight Ph.D theses have been completed in the Department during this short span.

1. Some Problems of Discrete Function Theory 1982
   (K. K. Velukutty)

2. Study of Discrete pseudo analytic functions 1983
   (Mercy K. Jacob)

3. Some Aspects of the History of Indian Mathematics in 18th and early 19th centuries 1984
   (Syed Aftab Husain Rizvi)

4. Discrete Commutative Difference Operator Theory 1985
(T. K. Thresiamma)

5. Studies in the Geometry of the Discrete plane 1985
(A. Vijayakumar)

6. Queueing and inventory models with rest periods 1985
(Jacob K. Daniel)

7. Some Problems in Set Topology relating Group of Homeomorphisms and order 1985
(P. T. Ramachandran)

8. Arma Modelling of Time Series Based on Rational Approximation of Spectral density function 1985
(Jessy John C)

The major areas in which research is being done in the Department are the following: Fluid Mechanics (Magneto hydrodynamics), Biomechanics, Bifurcation Theory, Numerical Analysis, Algebra, Topology, Geometry, Analysis, History of Mathematics, Sampling Survey, Probability, Stochastic Processes and Operations Research. The Department has undertaken and completed a research project on History with financial assistance from Indian National Science Academy, and is currently doing a project on Mathematical modelling and analysis of coastal erosion with help from the Department of Science and Technology. Two major projects on Mathematical modelling of renal flow and on Bifurcation theory and a project on fuzzy topology and applications have been prepared and sent for approval and assistance.

In addition to the regular teaching and research, the Department has undertaken continuing education programmes. It has conducted two U. G. C. Summer Institutes for college teachers and researchers, one in Statistics in 1979 and the other in 1985 in Computer Aided Numerical Analysis and Operations Research. Also intensive courses and seminars on various topics of interest to college teachers are organised regularly. In fact, the changes in the approach to the subject and in the method of teaching are to be effected at the grass root level. Having this in mind, the Department conducted in 1978, a Summer Institute for High School teachers of mathematics; organised short-term courses for parents and self-employed mathematics teachers and also organised, guided and continues to take the academic responsibility of the M.Sc. correspondence course in Mathematics originally contemplated as a quality improvement programme for school teachers.

There were many distinguished visitors to the Department during these years. These include, in the last 5 years, Peter Blanksby (Adelaide) and M. Rajagopalan (Nevada) for longer periods of three to four months, A. N. Chakravarti (IISc), R. P. Pakshiraian (Mysore) and this year H. C. Khare (Allahabad) under U G C National Lecture Scheme.

This young Deparment, under the stimulation and guidance that it obtained from its founder Proffessor Wazir Hasan Abdi, has been able to achieve a lot—of course, still there is a long way to go and there are many challenges to face. ●

COCHIN WHERE SEEDS OF DISCRETE MATHEMATICS HAVE BEEN SOWN

(Wazir Hasan Abdi)

We had been doing Mathematics all these donkey's years struggling with epsilons, deltas and infinities. And all for one purpose- to ensure continuity. But one day a question arose in our mind "Does continuity really exist in Nature?" "Was there anything wrong," we said to ourselves, "if an ordinary student of Mathematics has a brain-wave involving things other than Operations, Transformations and the like".

From times immemorial this question has troubled and engaged the minds of countless thinkers. Our own sages were divided regarding the structure of the Universe. While many schools like Nyāya Vaiśesika, Vaibhāsika and Sautrāntika belived in atomism, numerous schools of Āstika and Nāstika dars'anas were opposed to this view. In West and Central Asia Alghazzālī believed that the discreteness of space and Time itself is a proof of existence of The Creator, while Ibn Sīnā tried to disprove discreteness in Nature by using the classical Pythagoras theorem. In Europe, Descartes argued that the universe was a plenum while Newton belived that matter was porous.

But practising mathematicians were, in general, not too much worried about this problem. On the other hand a physicist A. Ruark (1931) discussed the roles of discrete and continuous theories in Physics and arrived at the conclusion that "the differential character of the principal equations of Physics implies that physical systems are governed by laws which operates with the precision beyond the limits of verification by experiment. This appears undesirable from an axiomatic standpoint" Then H. Morgenau (1950) had a real dig at the physicists: "A word might be said about the reason why physicists are often reluctant to accept discreteness. If it were to be established as the ultimate property of Time and Space, one or the other of two drastic changes in the theoretical description of nature would have to take place. One is the recasting of all equations of motion in the form of difference equations instead of differential equations and this is most unpalatable because of the mathematical difficulties attending the solution of difference equations. The other possible modification would involve the elimination of Time and Space coordinates ftom scientific description."

Ofcourse all this argument and counter-argument went above our heads, so deciding to be discreet we opted for discreteness and said good-bye to continuity. Our job now was to evolve some mathematical tools which coul'd not unreasonably handle the problems that believers in continuity had faced through smoothing. But we were not the first. There were already two streams of the Big Two. Abdullāev (1960, 61, 64, 70)

Babadzanov (1960, 61, 64), Chumakov (966) Fuksman (1957), Silich (1956) and their disciples were evolving their theories in the Soviet Union and Berzsenyi (1970, 72, 77), Deeter (1956, 64, 68, 69, 70) Duffin (1956, 64, 68, 71, 72), Kurowskie (1963, 64, 66, 67), Mastin (1970), Zeilberger (1977–78) and their ollowers were developing Discrete Function Theory in the United States of America. There were a few workers else where like Hayabara (1966) and Tu (1971–72) in Japan.

They all replaced the complex plane by a set of lattice points placed at the corners of squares, general rectangles or rhombuses etc. The operator was replaced by some difference operator accordingly. These concepts suffered from the two weaknesses :

(1) by no stretch of imagination the difference operator could be made to behave as a differential operator and

(2) there could be no lattice point which could have any nighbourhood.

The ground was broken by a young Australian Chris Harman, who was on leave from Veapon Research Establishment, Adelaide came to us for work in Information Theory. Weaned away from that royal road he struggled to remove the above difficulties by taking a real positive number Q less than one and a point (x, y) in the first quadrant he covered the entire plane by the set $H = \{ (\pm q^m x, \pm q^n y) ; m, n \text{ integer} \}$ His choice for the difference operators fell on θ_x, θ_y where $\theta_x f(x, y) = \{ f(x, y) - f(q, x, y) \} / \{ x (1-q) \}$, $\theta_y f(x,y) = \{ f(x,y) - f(x,q,y) \} / \{ iy (1-q) \}$ and when for function defined on H statisfies the equality $\theta_x f(x,y) = \theta_y f(x, y)$, f is called q-analytic. With this definition the fundamentals of q-analytic functions were laid down and the rudiments of a theory were evolved.

But this was in the first half of seventies and in 1977 when we returned home these rudiments were brought by us to Cochin. Young Velukutty came from Coimbatore to join us. He did not disturb Harman's Lattice H but took a fancy for δ_x and δ_y

where $\delta_x f(x,y) = \{ f(q^{-1} x, y) - f(qx, y) \} / \{ (q^{-1} - q) x \}$ and $\delta_y f(x, y) = \{ f(x, q^{-1} y) - f(x, q y) \} / \{ i (q^{-1} - q) y \}$

If $\delta_x f(x, y) = \delta_y f(x, y)$ then f is called q-monodifferic, He burnt midnight oil to establish fundamental properties of such functions especially q polynomials q-m-polynomials, Bipolynomials and their sequences. He has taken these germs back with him in 1982 but who knows if any attempts will be made at germination in Tamil Nadu.

Later Thresiamma (now Sr Kurien) got inspired by the idea of commutativity and struggling with q - analytic functions. Her prayers were answered and a new lattice based on two positive unconnected numbers p and q both less than 1 appeared before her which we called K (after her name)

$$K = \left\{ (\pm p^m x , \pm q^n y) ; m, n, \text{integers} \right\}$$

She chose two difference operators D_{px} and D_{qy} such that $D_{px} f(x, y) = \{ f(x. y) - f(px, y) \} / \{ (1-p) x \}$ and $D_{qy} f(x, y) = \{ f(x, y) - f(x,qy) \} / \{ (1-q) iy \}$. Also when $D_{px} f(x. y) = D_{qy} f(x, y)$, f is termed bibasic analytic.

It turned out that ordinary power function z^n can not be q-analytic, q-monodiffric or bibasic analytic unless n=0, 1, but each type has its own power function which satisfies the axioms analogous to those of the classical power, functions.

But that is not all; the geometric aspect based on the idea of distance have been tried by Vijai Kumar, who has produced his D-

linearity, r – sets, E - sets and played with them. Mercy had had considerable success in laying the foundation of pseudo-analycity on H. In this way varied seeds of discreteness have been sown but who knows if the crop will at all be marketable in our great country.

Another hard to sell stuff that Cochin is trying to produce is : History of Indian Mathematics. Aftab Rizvi of Kashi did make a ripple. Will it be the 'exeunt'. Well, what is the need of learning from our commissions and omissions in the past to draw lessons for the future when all that we need to know is what is cooking in Bronx and Bostan and then gulp the stuff !

KERALESE CALENDAR

— By S. PARAMESWARAN

From the earliest of prehistoric times man has been witnessing the mysterious movements of the sun, the moon, the planets and the stars. His initial reaction was wonder which later roused his curiosity and gradually he began to speculate. The sun and the moon came to be recognised as 'instruments' for the reckoning of time. The-time interval between two consecutive risings of the sun was called a day-a scheme which gained universal acceptance.

The concept of month seems to have emerged from a study of the movement of the moon in relation to the apparent movement of the sun. On a full-moon day, when the moon appears as a circular disc fully illuminated, the sun and the moon are on opposite sides of the earth and we see the moon rising on the east just when the sun is setting on the west. The moon will be observed to rise later and later every day, by three quarters of an hour to an hour, as is easily noticed by timing its rising for a few successive days. It keeps on losing as it were, on the sun, till, from being seen at sunset it does not rise till just before the sun in the morning. After this, the sun apparently passes it and a few evenings afterwards it is again seen in the west just after sunset, only to lose on the sun and be overtaken again as before, in the same manner as the hour-hand of a clock is overtaken and passed by the minute-hand.

Observations on the moon conducted for a few successive days starting from a full-moon day would reveal that the moon's shape appears to wane gradually from the full circular disc to an invisible (dark) disc in the course of about fifteen days. The day on which the moon becomes invisible is known as the new-moon (day). On the next day the moon appears as a thin crescent and there-after its shape seems to wax day by day till, after about fifteen days, the full moon is seen once again. Thus the moon appears to complete a cycle with respect to the sun in about thirty days; this period of thirty days came to be called a month.

Next we come to the concept of an year—a concept for which the sun, once again, is the source. According to the Hindus the six seasons-Vasantham, Grismam, Varsham, Sharath, Hemantham and Shishiram each of two months duration, recur in that order over and over again; the sun was observed in the sky north of the celestial equator for six months which period was denoted by Uthara-yanam and south of the celestial equator for another six months which period came to be called Dakshinayanam. These observations led the ancient Hindus to consider a period of twelve months significant enough to be given a special name and so called it an year. Thus arose the very popular table of reckoning time: two months make a season, three seasons an ayanam and two ayanams one year

Gradually man began to observe the numerous celestial objects, besides the sun and the moon appearing in the sky and notice the changes of positions that a number

of them seemed to undergo in course of time. These observations led him to the knowledge that reckonings made by his predecessors were not accurate. The full moon, after waning and waxing, to reappear as full moon again, does not take thirty days but only twenty nine and a half days, the ecliptic – the apparent path of the sun, among the fixed stars, in the course of the year - makes an angle of about 24° with the celestial equator and the sun appears to be at the same point on the ecliptic not after a lapse of twelve months each of thirty days but after a little over 365 days.

The day-the interval between two consecutive risings of the sun; a month of $29\frac{1}{2}$ days– the interval from one full moon to the next; a year of 365 and odd days; these could not be altered and had to be accepted as such. Since the number of days in an year is not an exact multiple of the number of days in a month, intercalary days or months were proposed[1], so as to rectify the differences than and there and not to allow them to accumulate and vitiate the reckoning of time in the long run.

So calendar-making turned out to be a difficult affair. While most of the Indian astronomers were tinkering with intercalary schemes, a few in Kerala (South India) started viewing the problem from a different angle. They felt that the main obstacle to resolve the difficulty lay in the dual linking i. e., linking of two of the items (the day and the year) with the sun and the third one (the month) with the moon. Then they took a very bold step– to delink the month from the moon and to associate it with the sun.

We have to take stock of the astronomical knowledge that prevailed then, in order to understand the scheme put forward by the Keralese astronomers in its proper perspective.

Ancient astronomers found by observation that the moon and planets were never at any time at a very great angular distance from the ecliptic; they therefore conceived an imaginary belt in the heavens extending for about 8° on either side of the ecliptic. Inside this space the moon and the planets and of course the sun were always to be found. They called this belt the zodiac. Within this belt along the ecliptic, the ancients picked out twelve groups of stars or constellations, one for each month of the year Excercising considerable imagination they gave these constellations the names we know of as the signs of the zodiac, because most of the names were those of animals, namely Aries (the ram) Taurus (the bull), Gemini (twins), Cancer (the crab), Leo (the lion), Virgo (virgin), Libra (the balance), Scorpio (the scorpion) Saggitarus (the archer) Capricornus (the goat), Aquarius (the water-bearer) and Pisces (the fish). This much was known to the ancients in almost all civilisations. In some countries the names of these constellations were used as such to denote the twelve months of the year.

Keralese astronomers did not stop with naming the months of the year after the signs of the zodiac; they went further to define a month as the period during which the sun is seen in any one of the signs of the zodiac. The idea of associating the month with the moon, which was considered inevitable by Hindu astronomers, was dispensed with by the Keralese savants, who redefined the month in terms of the apparent movement of the sun along arcs of the ecliptic. Thus all the three constituents (the day, the month and the year) of the calendar came to be linked with the apparent movements of the sun. The ecliptic was divided into twelve parts by means of imaginary lines, resembling the spokes of a wheel, the angle between any two consecutive spokes being 30° and each segment of arc, obtained by this division, was called a rasi (sign). The period required for the sun to appear to move through each rasi came to be called a month. The Keralese astronomers had observed the following phenomena and shaped a scheme indicated below:- It was observed that the

sun is not at the same distance from the earth on all days throughout the year, from which they inferred that the ecliptic is not circular in shape; further they had noticed that the sun was not moving with uniform speed along the ecliptic; it took more days to cover a rasi which is farther away from the earth than the one which is nearer. Since each month was linked with the sun's apparent movement through a rasi, all the twelve months could not have equal number of days. This resulted in their adopting a scheme in which the durations of seven months would range from 30 to 32 days and those of the remaining five months would range between 29 and 30 days. The transition of the sun from one rasi to the next could occur at any time of the day. So they declared that a month begins on a particular day if the transition takes place before noon that days otherwise the month begins the next day (Of course there are other conventions connecting the beginning of the month and the transition of the sun to concerned rasi) This rule accounts for the occasional variations in the number of days in some months over the years.

An analysis of the Keralese calendar for 100 years (1061 M E to 1160 M.E.) gives the average durations of the different months of the Keralese calendar as follows (correct to 2 places of decimals.):-

Name of month Gregorian calendar	Name of corresponding month Keralese calendar	meaning of the word denoting name of month	Duration in days
September	Chingam	lion	31.03
October	Kanni	Virgin	30.46
November	Tulam	Balance	29.93
December	Vrischigam	Scorpion	29 54
January	Dhanu	Bow	29.39
February	Makaram	Sea-monster	29.48
March	Kumbham	Water-pot	29.83
April	Meenam	Fish	30 35
May	Medam	Ram	30.91
June	Edavam	Bull	31.34
July	Mithunam	Twins	31.58
August	Karkatakam	Crab	31.42
	Chingam		365.26

Note that the worda 'bow', 'sea-monster' and 'water-pot' occur in the above list instead of 'archer', 'goat' and 'water-bearer' respectively, occurring earlier in this article.

The table, given below, indicates the average durations of the months as calculated by Keralese astronomers based on the transitions of the Sun from each rasi to the next. The durations are subject to an error of upto 9 minutes because of lunar and planetary perturbations:-

Nane of month	Duration in			
	Days	hours	minutes	Days (in decimals)
Chingam	30	23	51	30.99375
Kanni	30	11	48	30.49166
Tulam	29	23	38	29.98472
Vrischigam	29	14	31	29.60486
Dhanu	29	10	39	29.44375
Makaram	29	12	59	29.54097
Kumbham	29	20	58	29.87361
Meenam	30	08	38	30.35972
Medam	30	21	02	30.87638
Edavam	31	06	44	31.28055
Mithunam	31	10	57	31.45625
Karkatakam	31	08	24	31.35000
	365	06	09	365 25622

(Thanks are due to Prof. P. U Krishna Varier of Kottayam for supplying me with the second table given above)

The two tables, given above, show that the five consecutive months Tulam, Vrischigam, Dhanu, Makaram and Kumbham, each has less than 30 days on the average and that the seven consecutive months Meenam, Medam, Edavam, Mithunam, Karkatakam, Chingam and Kanni each has more than 30 days on the average (a majority close to or more than 31 days); further the tables show that the durations of the months increase from Dhanu to Mithunam and then decrease from Mithunam to Dhanu completing a cycle.

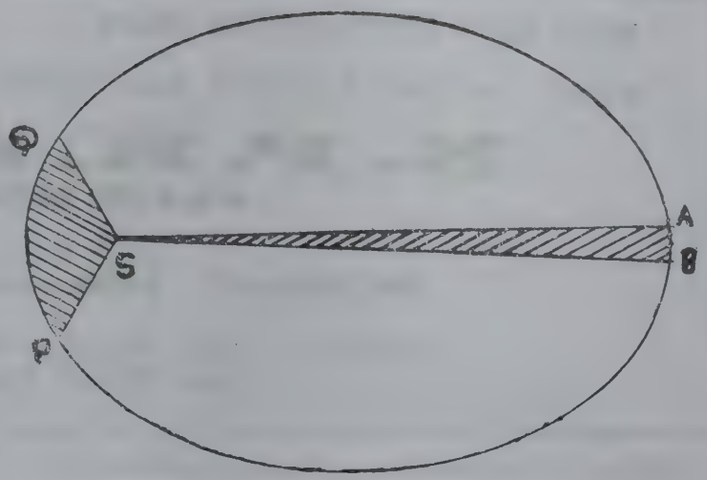
Was this scheme an exclusive one of Keralese astronomers? The answer is an emphatic No. This scheme of time-reckoning entirely linked to the sun, with solar day, solar month and solar year, has been prevalent in Tamil-speaking areas of South India also. Now we are faced with the following questions: whether the Tamilian astronomers learned it from their counterparts in Kerala or vice-versa? Was the scheme common to all the Dravidians? A. R. Rajaraja Varma is of opinion[3] that the scheme originated in Kerala and then spread to the Tamil country. His reasoning runs thus—It is seen that the names of the various months of the year, in Tamil, are derived from those of the lunar months; lunar months owe their names to the stars associated with the full-moon occurring in the respective months Chaitram from Chitra, Vaishākham, from Vishākham etc. The lunar months Chaitram, Vaishākham, Jaishtham or Ānurādham, Āshādam, Shrāvanam, Proushtapādam, As'winam, Kārthikam, Mārgashirsham, Pousham or Taisham, Māgham, Phalghunam of the Hindu Calendar are respectively known as Chithirai, Vaikasi Āni, Ādi, Āvani, Puratā'si, Alpa'si Kārthikai, Mārkazhi, Tai, Mās'i and Panguni in the Tamilian Calender. The corresponding names

in the Keralese Calendar are Medam, Edavam, Mithunam, Karkatakam, Chingam, Kanni, Tulām, Vris'chikam, Dhanu, Makaram, Kumbham, and Meenam respectively which are associated with the constellations in the signs of the Zodiac. (as can be seen from the table given in this article) and have no connection with lunar months. Hence the conclusion that the completely solar scheme of calendar - making originated in Kerala and was later adopted by the Tamilians seems reasonable and highly probable.

Since people speaking other Dravidian languages such as Telegu, Kannada etc. are still using the lunar month scheme, the solar-month scheme, mentioned above, has no claim to be considered a 'common property' of the Dravidians.

Lastly let us compare the Keralese Calendar with the Gregorian Calendar. The number of days in a month, except February, in the Gregorian Calendar fluctuates between 30 and 31 days almost alternately in contrast to the five consecutive months having 29 to 30 days and the seven consecutive months having days ranging from 30 to 32 in the Keralese Calendar. Further, in the Keralese Calendar one of the two months Dhanu or Makaram is the shortest having only 29 days and the other does not have more than 30 days; the corresponding month January of the Gregorian Calendar, which overlaps with the latter part of Dhanu and the former part of Makaram has 31 days. Just so, June which overlaps with the latter part of Edavam and the former part of Mithunam, has only 30 days while one of the two months mentioned above, of the Keralese, calendar, is the longest with 32 days and the other has 31 days almost always.

The scheme discussed above is the one found in the Keralese calendar of the Kollavarsham or Malabar Era (M E.), which began in 825 A. D. This scheme of calendar-making, by implication, anticipates the first two laws of planetary motion enunciated by Kepler (1571-1630) namely :- (i) Each planet moves in an elliptic orbit with the sun in one of the foci and (ii) The straight line drawn from the sun to a planet (the planet's radius vector) sweeps equal areas in equal times.



Kepler's second law asserts that, if the times of describing the arcs AB and PQ are equal, then the area of the sector SAB = area of the sector SPQ. From this we can conclude that the nearer a planet approaches the sun, the greater must its velocity be-making the durations of the corresponding months shorter and shorter.

The aforesaid details, I think, are enough to convince anyone that the Keralese Calendar is the most scientific one.

(It has to be remembered that in those days the Keralese astronomers like their contemporaries all over the world, believed in what they saw i. e., a statonary earth with the other celestial objects moving. Hence their calculations were based on the relative motion of the sun etc. with respect to the earth)

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KERALA - THE CULTURAL HERITAGE

by A. S. M.

Kerala has made rich and varied contributions to the cultural heritage of India. Kerala culture has been an integral part of the mainstream of Indian culture. It has a spacious history, the beginnings of which can be traced back to ancient past. Kerala culture is a composite culture which has been enriched through the ages by the contributions of several peoples and races. Its history is the story of synthesis, assimilation and fusion of old traditions and new values in every sphere of human thought and activity. In fact, the salient feature of Kerala culture is "Unity in Diversity."

An important factor that has helped the process of cultural synthesis in Kerala is its peculiar geographical position. A long and narrow territorial belt lying between the Arabian sea and the Western Ghats, Kerala possesses all the distinctive features of a natural geographical unit. This has enabled Kerala to enjoy through the ages a degree of isolation from the rest of the subcontinent and develop its own outlook, way of life, culture and institutions without being subjected to undue extraneous influences. This isolation did not, however, stand in the way of the people of Kerala establishing extensive contacts with people in other parts of India or abroad. Several races and peoples from across the sea or the mountains have set foot on Kerala soil and forged political and religious links with the people of the land. Kerala culture has been flourishing through the ages, thanks to its vitality, catholicity and universality.

The culture of Kerala is also characterised by unique richness and variety in such diverse fields as religion and philosphy, art and architecture, education and learning, language and literature and political and social organisation. All through its history the genius of Kerala has blossomed forth in all its vigour and vitality and has helped its people to reach the peaks of excellence in all their endeavours.

Religions

The storry of the rise and spread of religions in Kerala is the exciting story of the confluence of religions. Even in the ancient period Kerala emerged as the meeting ground of all Indian religions and philosophical systems as well as the most important world religions. The people of ancient Kerala originally followed the Dravidian way of life and religious practices. With the coming of the Aryan religions like Jainism, Buddhism and Brahminism from the north, there were striking changes in the Dravidian way of life. The electic outlook of the people made them welcome the new religions Eventally all these religions came to prosper side by side in an atmosphere of goodwill and amity. In fact, the people had no objection to offering prayers in Jain and Buddhist shrines or

performing Vedic rites at the same time. This resulted in a gradual synthesis of Aryan and Dravidian practices. The most celebrated of the Hindu religious teachers of Kerala was Sankaracharya (787–820 A. D.), a Namboothiri Brahmin born at Kaladi. The genius of Kerala for cultural synthesis and reconciliation found supreme expression in his teachings, His philosophy of **Advaita Vedanta** emphasised the oneness of the individual soul with **Brahman**, the all pervading cosmic force and allowed the worship of God in different forms. Sankara combined the best elements of Hinduism and Buddhism in his teachings and methods.

The history of Christiantity in Kerala is the history of the rise and growth of religious denominations under the impact of diverse cultural influences. According to tradition, Christianity was introduced in Kerala in the 1st century A. D. by St. Thomas, the Apostle. He is said to have landed at Maliankara, a place adjoining Muziris, in 52 A D. converted several Brahmin families and founded seven churches on the Kerala coast. In the course of centuries Christianity was accepted in Kerala as an indigenous faith and it obtained substantial following among the people. The Christians gained prominence in the field of trade and commerce and received several privileges and favours from the native rulers. They were treated on a footing of equallty with the Hindus and assigned a place of honour in the economic and social life of the land. The Portuguese who established their political influence in Kerala after 1498 A.D. introduced the Latin rite.

The Jews have been an interesting and colourful religious minority living in Kerala since the first century A. D. They are belived to have come to Muziris in 68 A. D. in order to escape themselves from the agony of religious persecution at home. Later they settled themselves in such places as Parur, Mala and Pullut. With the arrival of the Portuguese, the Jews were forced to leave Cranganore for Cochin. With the birth of the Jewish State, the Jews migrated **en masse** from the State. According to the 1971 census, there are only 112 Jews in Kerala.

The commercial contacts between Kerala and Arabia led to the advent of Islam into Kerala in the 8th centuary AD itself. The patronage of the Zamorins of Calicut was also an important factor in the spread of the religion in north Kerala. In the course of centuries Islam spread to all parts of Kerala and today, next to the Hindus and Christians, they are the most influential community in the State.

Religious Practices

The Hindus of Kerala worship all the major Gods and Goddesses of the Hindu pantheon as well as several minor deities. The worship in Kerala temples is prescribed by the **Agamas** and the **Tantras** The **puja** is performed by the priest after having purified himself by the performance of **dhyanam** and **japam** (meditation and prayers). Usually **puja** is performed by the offerings of water, flower, sandal, incense, camphor etc. The churches in Kerala come broadly under two categories, viz., Catholic and non-Catholic. Among the former are the churches following Syriac, Latin and Malayalam rites and they owe allegiance to the Papacy. The non-Catholic churches belong mainly to the Jacobite Syrian or Orthodox Syrian Church, the Mar Thoma Church and the church of South India. The Sunnis form the majority of the Kerala Muslims and their religious observances conform to the Shafi Law. They observe the five essentials of Islam viz , the recital of the **Shahadat** or creed, the five daily prayers (**Niskaram**), observing the Ramzan feast, giving alms to the poor (**Zakkat**) and the pilgrimage to Mecca (Haj). Cleaning of hands and feet precedes every prayer. The **Quran** is held in the highest esteem.

Festivals

Kerala has its own festivals and festivities which invest the State with a unique atmosphere of gaiety and charm. While

some of them are peculiar to Kerala, quite a few are all-India festivals. Onam, the most typical Kerala festival, which coincides with the harvest season, is an occasion for spontaneous revelry. It falls in the month of Chingam (August - September). According to tradition it celebrates the home-coming of Mahabali, the legendary king who ruled over Kerala in an age of plenty and was pushed down to the infernal regions by Vishnu in the form of Vamana. The following English version of a popular Malayalam folk song "Maveli Nadu Vanidum Kalam" evokes nostalgic memories of the bygone golden age of Mahabali in the minds of the people even today.

"When Maveli rules over the land
All people form an equal band
And as they live in joy and charm
Every one is free from harm
There is no theft and no deceit
And no one speaks an untruth yet
Weights and measures are all correct
No one tries to cheat or corrupt
When Maveli rules over the land
All people form an equal band".

Onam is being celebrated in Kerala as national festival under Government auspices since 1961. It synchronises with the Tourist Week Celebrations in the State. The Onam celebration starts formally on the day of **Atham** asterism. The image of Trikkakkara Appan (Vishnu as Vamana **Avatar**) is installed in every Hindu home during the Onam season. Children go round collecting flowers for decoration of the front portion of their houses in artistic designs and patterns which change every day. The Vishu festival is celebrated by the Hindu on the first day of Medam (April-May), the astronomical New Year day. As the people believe that the fortunes of the coming year depend on the first object they see on Vishu day, the most important ceremony connected with Vishu is the **Kani-Kanal** which literally means the first sight. **Kani** is arranged in a convenient room in every Hindu home and it consists of a number of auspicious things collected in a circular bell metal vessel. **Thiruvathira** which falls in the month of **Dhanu** (December - January) is primarily a Nair womens' festival. It commemorates the death of Kamadeva, the Cupid of Hindu mythology. The aim of the celebration is conjugal harmony and happiness. On the festival day the Nair women get out of bed early in the morning, take their bath and worship in the nearest temple. The **Navaratri** festival which is called **Dasara** in Karnataka and **Kalipuja** in Bengal, is celebrated by the Hindus of Kerala as **Saraswathi Puja**. Saraswathi is worshiped as the Goddess of Learning. **Maha Sivaratri** the great night of Siva, is celebrated by the Hindus in **Kumbham** (February - March). The annual Sivaratri festival held on the banks of the Periyar at Alwaye is one of the most spectacular local festivals of Kerala which attracts thousands of pilgrims from all over the State. It has been compared to the **Kumbha-Mela** at Prayag. The **Vallomkali** or boat-regatta is typical of Kerala in so far as it shows the total identity of the people with the rural landscape and environment. Many of the boat festivals, except the one at Punnamada Kayal in Alleppey, have religious origin but they have assumed a cosmopolitan character because of the participation of all classes of people. While the colourful boat regatta held in August in the Punnamada Kayal commemorates the visit to Alleppey of Prime Minister Nehru, those at Aranmula and Champakkulam have a religious significance. Apart from the religious or semi-religious festivals described above, each temple in Kerala has its own festival (**Utsavam**). The number and size of the festival depend on the fame and wealth of the temple. In the major temples the celebration is on a larger scale and is spread over several days. The Sabarimala festivals the **Ashtami** festivals at Vaikom, the Trichur **Pooram** and the Kottiyer festival are among the temple festivals of all-Kerala importance. The **Mandalapuja** and **Makaravilakku** attract lakhs of people from all over the State and outside. Among the temple **poorams** of Kerala the Trichur Pooram is the most famous. It attracts crowds from all over South India. The festival is held

on the day of Pooram asterism in **Medam** (April-May). There are also other temple festivals which have local importance. The Sri Padmanabhaswami Temple of Trivandrum has two **Arat** festivals one in **Thulam** (October - November) and the other in **Meenam** (March-April), each lasting for ten days. The climax of the two festivals is the Arat procession from the temple to the beach for the Arat of the deity with the Maharaja of Travancore at its head. The main festivals of the Christians are Christmas and Easter. Christmas which falls on the 25th of December commemorates the birth of Jesus Christ and is a jovial celebration accompanied by time-honoured customs. In all the churches in Kerala the Holy Mass is celebrated three times in connection with Christmas, the first one starting at midnight. Apart from the common Christian festivals of Christmas and Easter observed in all churches, there are the annual **Perunnals** (festivals) celebrated by them. The St. George Church, Edathua, is famous for its feast of St. George, celebrated for 11 days from 27th April to 7th May. Thousands flock to the place and they include non-Christians as well. The St, Sebastian's feast at St. Andrew's Church Arthungal, celebrated from January 21st to 30th, is a major event. The greatest of the festivals celebrated by the Catholics in Kerala is the one at the St, Thomas Shrine at Malayattur. It falls on the day after Easter in the last week of March or first week of April. Thousands of pilgrims undertake the arduous trip to the shrine situated on a hillock 1500 ft. high in order to participate in the festival. The major festivals observed by the Muslims of Kerala as elsewhere in the world are **Bakrid** (Idul Azha) and Ramzan (Idul Fitr). The former is called by the Kerala Muslims **Valiya Perunnal** and the latter **Cheriya Perunnal.** Muharram is another Muslim festival celebrated by Muslims on the 10th of the Muharram - the forbidden month which marks the beginning of the Hijra year. It is not celebrated on such a large scale in Kerala as the other festivals. The Kondotti and Mampuram **Nerchas** attract Musilms from all over the State. An important local Muslim festival is the one that takes place at Kasargod every year in commemoration of the arrival of Malik Ibn Dinar.

Sports and Games

The People of Kerala have given special attention to the develcpment of physical cultural and martial art forms from very early days. The **Kalaris** or **Gymnasia** developed as centres where the youth of the land were given military training. They evolved in the **Kalaripayattu** one of the advanced combat sciences of India. This martial art produced great heroes like Tacholi Otenan (16th century) whose deeds of heroism are described in folk songs and legends. The Kalaris functioned vigorously till about the 17th century when the use of guns and cannons became widespread. It may be noted that the achievements of Kerala in the field of modern Circus are due to the superb skill of its people in the art of Kalaripayattu. The **Parisakali** of the Mappilas of North Kerala is popular and entertaining folk play which is performed under guidance of a teacher **(Gurukkal)** who trains the boys in **Kalari** specially set up for the purpose. A similar martial art which has survived in south Kerala is the **Velakali**. The Christians of Kerala have developed their own martial arts called **Margam Kali** and **Parisamuttu**. The latter is a mock fight. In **Margam Kali** twelve Christian warriors, trained in the **Kalari,** with sword and shield in hand move in a circle and sing the song of St Thomas which describes the introduction of Margam or Christian way of worship in Kerala. In addition to the above mentioned, there are a number of traditional sports and games. The **Onathallu** was a kind of boxing where blows are given with open arms rather than with closed fists. **Talapandu** is the Kerala version of the English foot ball, and it is played with the help of both hands and feet. Apart from the material arts, sports and games described above, the people of Kerala have developed over the centuries a variety of amusements and pastimes. **Kathakali, Kuthu, Kudiyattam** and **Tullal** are the most prominent among them. **Patakam,** a kind of discourse in which a single actor narrates Puranic stories, is an old pastime. **Harikatha** is another version of **Patakam** but it has more musical overtones than

Patakam. These two entertainments are generally held in the precincts of the temple but **Kathaprasangam** which is modern development of the above arts is fully secular and deals with social themes. In **Kurathiyattam** stories about Siva and Parvathi are sung to the accompaniment of dance and music.

Dance and Dance Forms

Kerala evolved from very ancient days its typical dance forms. Folk dances performed with a view to propitiating the dieties of the hills and forests represent the beginning of Kerala dances. The early Aryan settlers trained a group of men called Chakiars as professional dancers and they developed the art of **Kuthu** and **Kudiyattom**. Meanwhile, the **Gita Govinda** of Jayadeva the Bengali saint of the 12th century, found its way into Kerala and this led to the raise of a new form of dance known as **Ashtapadi Attam. Kathakali** represents a happy synthesis of all that is best in dance, drama and music. It is distinguished by several unique features. It combines within itself both the **thandava** and **lasya** elements of dancing It is generally an all-night performance in which the male characters dominate Women generally do not act in **Kathakali,** the roles of female characters being assumed by men. The actors in Kathakali do not speak, but only act dialogic sections called **padams** sung by singers from behind. The acting is done through facil expressions and **hastalakshanas,** popularly known as **mudras** (hand gestures). The impact left by the makeup and the costumes makes **Kathakali** a visual art par-excellence. The whole face of the artist is painted over and it would appear as though he is wearing a mask The Kerala Kalamandalam, Cheruthuruthi, founded by Mahakavi Vallathol, has played a leading role in developing **Kathakali** on more popular lines. The **Kathakali** themes are usually drawn from the the Epics and the Puranas, but non-Hindu themes like Biblical stories have been presented on the reformed stage. There have been changes in stage direction and use of make-up materials. **Mohiniyattam** is another typical dance form of Kerala. Literally it means "the dance of the enchantress". Its origin may be traced to the **Dasiyattam** developed by the Devadasis in Kerala temples in the past. In modern times Swati Tirunal Maharaja of Travancore extended his patronage to the art. He composed a number of padams and padavarnams for staging **Mohiniyattam** and also designed the the costumes to be used. He also reformed the art by incorporating into it elements borrowed from **Kathakali, Bharatanatyam** and **Kaikottikali.** In spite of the encouragement given by Swati Tirunal, Mohiniyattam did not win much respectability as an art form, but it has since been developed in the Kerala Kalamandalam in such a way as to make it popular with students and teachers of art from other parts of India and even abroad. **Ottam Tullal** is a solo-dance in which a single actor wears colourful costumes as in Kathakali and recites **Tullal** songs to the accompaniment of dancing and acting. Tradition assigns its origin to the ingenuity of the great poet Kunjan Nambiar. The **Yakshagana** which is typical of the Kasargod area of Kerala also deserves mention among the dances of Kerala. **Kuthu** and **Kudiyattam** are the earliest of the theatrical arts of Kerala. **Kuthu** is a mono-act in which a single actor, the Chakiar, acts the role of all the characters to the accompaniment of **mizhavu** (a close-necked copper metal drum) played by the Nangiar (woman of the Nambiar community). Kudiyattam is a theatrical art which presents a full-fledged drama or select portions thereof. More than two or three actors appear on the stage at the same time as in a modern drama. The Chakiar performs the role of the male characters and the Nangiar that of the female characters. The Nangiars also sound the cymbals and recite the Sanskrit verses which the Chakiar enacts. **Chavittu Natakam** which is now almost defunct is a theatrical art evolved by the leaders of the church, under the guidance of the Portuguese missionaries, as a Christian alternative to

temple at Trikodithanam, the Siva temples at Ettumanur and Vaikom, the Subramonia temple, Udayanapuram, the Vadakkunathan temple, Trichur, the Krishna temple, Guruvayur, The Sri Rama temple, Triprayar and the Siva temple, Triprangode are among the many temples of Kerala which contain exquisite mural paintings. Mural paintings with Hindu religious themes may be seen in the main palaces. The Padmanabhapuram Palace has in its topmost floor (**Upparika Malika**) more than forty murals. The Dutch palace, Mattancheri, contain murals depicting scenes from the Ramayana and Hindu mythology. The Krishnapuram Palace at Kayamkulam has preserved a large panel on **Gajendramoksham** which has assigned to the first half of the 18th century. The **Natyagriha** recently built in the Kalamandalam at Cherurhuruthi (1977) contains the latest specimens of mural paintings in Kerala. The churches of Kerala contain paintings which depict characters and scenes from Christian mythology. Swati Tirunal, the great ruler of Travancore, extended generous patronage to the art of painting. Alagiri Naidu, a distinguished painter from Madurai adorned his court. He gave training in the art of painting to Raja Raja Varma of the Kilimanur royal family and the latter in his turn trained up his talented nephew Raja Ravi Varma. The well-known European oil painter, Theodre Jenson, also initiated Raja Ravi Varma into the techique of European oil painting and he ped him to achieve international reknown. The innumerable pictures of Gods and Goddesses painted by Raja Ravi Varma which adorn most of the Hindu homes all over India are even today objects of mass worship. Raja Ravi Varma's own sister, Mangalabhai Tampuratti, specialised herself in painting picturers of women and children which won universal appreciation from connoisseurs of art. In modern times, Kerala produced two outstanding painters, viz. K. Madhava Menon and KCS Panikkar. The former excelled in the portrayal of plant and animal life. A refreshingly original style of his own is Panikkar's legay in the field.

Architecture

Kerala has made its notable contributions to the science of architecture, both secular and religious. The **Tantrasamuchaya**, **Vastuvidya**, **Manushyalaya Chandrika** and **Silparatna** are well-known treatises on the subject. The Manushyalaya Chandrika is a work devoted to domestic architecture. The traditional Kerala house is a quadrangular building called **Nalukettu** constructed strictly in accordance with the principles of Tachu Sastra (Science of Architecture). It was located in a self-contained compound and was specially designed to cater to the needs of the huge **tarawads** o fold under the **Marumakkathayam** (matrilineal) system. The **Nalukettu** was so called because it consisted of four blocks viz., the **Vadakkini** (northern block), **Padinjattini** (western block) **Kizhakkini** (eastern block) and **Thekkini** (southe n block). The house was generally built of laterite plasted with Chunam and the roofs were tiled or thatched with the leaves of the palmyrah or coconut trees. The wood work of the building was usually solid and beautifully carved. It may also be noted that the old palaces of Kerala represent the style of traditional domestic architecture. The most important palaces that deserve mention are the Padnabhapuram Palace (Kanyakumari District), the Dutch Palace at Mattancheri and the Krishnapuram Palace near Kayamkulam. In recent times domestic architecture has undergone significant changes in style and design The houses are now built only to accommodate single households. Cement concrete houses have taken the place of the traditional houses made of brick set in either mud or lime. The Kerala temple has a distinct architectural style which has been acquired as a result of a long process of evolution. The rock-out temples are among the earliest known of the temples of Kerala and they are assigned to the period prior to 800 AD. The structural temple of Kerala had its origin during the 9th centurary AD

the Hindu **Kathakali**. It presents stories from the lives of Christian saints and the history of Christianity. Unlike in **Kathakali**, the actors in **Chavittu Natakam** not only speak and sing but also stamp on the wooden platform with their feet to the tune of songs and beating of drums. In modern times Malayalam drama as a form of popular entertainment has acquired enormous popularity. In the latter half of the 19th century the translation of **Abhijnana Sakuntalam** by Kerala Varma Valia Koil Thampuram and its successful presentation on the stage gave a fillip to Malayalam drama. The successful enactment of Tamil musical plays by drama troupes from Tamil Nadu in different parts of Kerala helped to hasten this trend. The composition of series of short plays with historical themes by C. V. Raman Pillai and their enactment by amateur clubs in Trivandrum marked a turning point in the evolution of modern Malayalam theatre. Dramas with social themes soon replaced historical plays. Special mention may be made of V. T. Bhattatirlpad's **Adukkalayil ninnu Arangathekku** and K. Damodaran's **Pattabakki**. With the increasing popularity of Malayalam drama as a medium of popular entertainment professional troupes like KPAC, he Kalidasa Kala Kendram and Kalanilayam have made their mark in the field in recent times. Thus the professional theatre has come to acquire its place in the social and cultural life of modern Kerala.

Music

Music like dancing, had its origin in the primitive dances and plays, developed by the ancient people in propitiation of the deities of the hills and forests. An indigenous classical music called the **Sopanasangita** developed itself in the temples of Kerala, in the wake of the increasing popularity of Jayadeva's **Gita Govinda** or **Ashtapadi**. The Reign of Swati Tirunal, the ruler of Travancore, is called "the Augustan Age of Kerala Music". A great patron of music, he attracted to his court some of the gifted musicians of the age. In collaboration with his **Guru** Meruswami who was well-versed in Hindustani and Karnatic music, Swati Tirunal composed a number of songs in popular **ragas** in a variety of languages. Four musicians from Tanjore by name Vativelu, Ponnayya, Chinnayya, and Sivanandan, otherwise known as the "Tanjore Quartettee", lived in his court. To Vativelu goes the credit for the introduction of violin in Karnatic music. The Tanjore brothers were also highly gifted in **Bharata Natyam** and under their influence Swati Tirunal composed **Varnas, Swarajits, Padas** and **Tillanas** for staging this dance form. Subbukutty Ayya, a master of Vina, was also a leading light in Swati's court. The **Kathakali padas** composed by a galaxy of scholars like Irayimman Thampi and the **Tullal** songs of Kunjan Nambiar also enriched the musical culture of Kerala. In addition to the musicians mentioned above who came to Swati's court from outside Kerala, several gifted local musicians also enjoyed his patronage, the most celebrated among them being **Shadkala** Govinda Marar. Two other Kerala musicians who adorned Swati's court were Parameswara Bhagavatar of Palghat and Maliyakkal Krishna Marar. Irayimman Thampi a close associate of Swati Tirunal, was also a musician and composer of high calibre who lived in the royal court and collaborated with the Maharaja in his efforts to promote the cause of cultural development. The tradition of Kerala in the field of music has continued unsullied in modern times. To the galaxy of modern Kerala musicians belong such stalwarts as Vina Kalyanakrishna Bhagavatar, Kathakalakshepam, Anantarama Bhagavatar Palghat Mani and Chembai Vaidyanatha Bhagavathar who have substantially enriched Karnatic music by their valuable contributions.

Paintings

Kerala has a tradition in the field of painting as is evidenced by the murals in temples, palaces and churches. Most of the murals now seen in Kerala temples belong to the period from 15th century onwards. The murals in the Sri Padmanabha temple, Trivandrum, depicting Puranic themes are noted for their remarkable finish and grace and they belong to the period from the middle of the 17th to the 18th century when the pictorial art enjoyed full state patronage. The Vishnu

The structural temple of Kerala had its origin during the 9th century AD. The Kerala temples have been built in square, rectangular, circular, apsidal and elliptical ground plans. The dominance of the circular shrine is a unique feature of temple architecture in Kerala. In the early period the Christians of Kerala seem to have built their churches after the model of Hindu temples, as is evidenced by the alleged action of Vasco-da-Gama in entering a Kali temple at Calicut mistaking it for a Christian church. The first church to be built in the new style was Santo Antonio, the present St. Francis church, Cochin. The St. Francis church provided the model for the construction of more churches in India. In modern times styles of church architecture from outside have influenced the construction of churches in Kerala. The Puthen Palli at Trichur with its arches, vaults, steeples, flying buttresses and stained glass windows has been built after Gothic style. The St. Joseph's Cathedral of the Latin Christians at Palayam, Trivandrum and the Kothamangalam church are Romanesque in their architectural style. The St. Thomas Pontifical shrine, Kodungallur, resembles the St Peter's church in Rome. The new Orthodox Syrian church at Kolancherri (the church of St. Paul and St. Peter) is one ot the finest specimens of modern church architecture in Kerala. The traditional Kerala mosque is a simple two-storeyed building with tiled roofs But there are a few mosques, like the Jumamasjid at Palayam, Trivandrum and Puthiya Palli at Calicut in Kerala now which are reminiscent of the Islamic style of achitecture prevalent in north India The stone and wood carvings of Kerala show the high level of sculptural excellence attained by Kerala artists. The temples of Kerala contain exquisite sculptures, particularly in stone, which exhibit diverse influences such as Pandya, Chola, Vijayanagar etc. The churches of Kerala have also enriched the sculptural tradition. In many churches may be seen huge granite Cross erected on beautifully carved granite platform.

Handicrafts

Industrial arts and handicrafts form an invaluable part of the cultural heritage of Kerala. Metal crafts have the pride of place among the traditional arts. Bell-metal casting is an old time industrial art. Wood craft is one of the ancient arts of Kerala as is testified to by the temples and churches of the State which abound in wood carvings. Items of furniture like chairs, tables, settees, sofas, almirahs, cots, radio casings etc., and models of animals and deities, toys and **Kathakali** accessories produced by Kerala craftsmen are very much in demand. The models of caparisoned elephants and the carvings of **Kathakali** dance-dolls are items of popular demand. Ivory carving is another traditional art of Kerala. The art was given an impetus by Swati Tirunal Maharaja. An ivory throne made by Swati Tirunal is still preserved as a show piece.

The 19th century saw the establishment of a number of institutions which have an important place in the cultural life of Kerala. One of the earliest in the field is the Trivandrum Observatory found by Swati Tirunal (1829-1847). The Trivandrum Museum and Zoo, one of the most important of its kind in the country, was started in 1853 during the reign of Uthradam Tirunal (1847-60). It came to be accommodated in the present building named the Napier Building in 1880 towards the end of the reign of Ayilyam Tirunal 1860-1880). The reign of Sri Mulam Tirunal saw remarkable progress in the cultural field. The Sri Chitra Art Gallery which came into existence at Trivandrum in 1935 during the reign of Sree Chitra Tirunal Balarama Varma is a treasure house of paintings. It is noted particularly for its valuable collection of the paintings of Raja Ravi Varma. The Museum, Zoo and Botanical Gardens were started in Trichur in 1885. The Kerala Kalamandalam was founded at Cheruthuruthi by poet Vallathol in 1930 and it was taken over by the erstwhile Cochin Government in 1942. The three Akademies viz., Kerala Sahitya Akademi, the Sangeetha Nataka Akademi and the Lalit Kala Akademi which function under Government auspices with their headquarters at Trichur have done much in promoting the cause of cultural advancement in recent years.

Science for Social Revolution

—M. P. Parameswaran

The Kerala Sastra Sahitya Parishad (KSSP) is a voluntary association of people desirous of using science for social revolution. Revolution is a discontinuity, to put it in simple mathematical terms.

Our society is often alleged to be a static one. This is not so. It is continuously changing. The majority of the people are becoming relatively and absolutely poorer and poorer and minority is becoming richer and richer. This is well documented by the studies of various governmental and non-governmental agencies. One is the result of the other. This is not the society people fought and sacrificed their lives for, this is not the society cherished in our constitution, this is not the society Gandhiji died for. This process has to be reversed. The majority, which may come to as high as 95-98% of the total, which is getting impoverished or at least face the threat of impoverishment should become richer and be saved from the threat. The small group which is becoming richer and richer at the expense of the majority should be prevented from doing so and their wealth has to come down. This reversal of the social process is what we mean by social revolution.

KSSP desires this revolution to take place. It is not the organization either to carry out or to lead this revolution. Various mass organizations and class organizations are working for this. KSSP is convinced that without making use of science, both scientific method and scientific knowledge, they will not be able to bring about this revolution. Science and technology are playing an important role in maintaining the present society and its movements. Science is now a powerful instrument in the hands of the minority, serving them to exploit and oppress the majority. Unless the majority too becomes armed with the weapon of scientific temper and scientific knowledge it will not be able to resist and put an end to this exploitation and oppression.

Kerala Sastra Sahitya Parishad had dedicated itself to this task of arming the people and their various movements with the weapon of Science.

The word "Science", too, need to be defined. It is not used in the conventional sense of 'physical' sciences or 'exact' sciences. Man is the only animal which purposefully interacts with the environment, both physical, biological and social environment, in order to change it. In the process he acquires enormous amount of experience which is generalized and abstractised to a lesser or higher degree, reformulated and used for new method and forms of intervention. This leads to newer experiences and the cycle continues. This entire process from experience to generalization, from hand to head, and back to new form of action is the content of the word Science. Since it involves both physical biological as well as social environment, not only physics, chemistry and biology, but also history and economics, painting and politics, music and dance -each and every human activity becomes subject matter of science. The conventional difference between science and art, between head and heart, disappears without losing the objectivity of either This explains the wide range of the activities of KSSP which can be roughly classified as below:

PUBLICATION

Propagation of periodicals and books meant for popularisation of science and generation of scientific outlook among all sections of the people, is considered to be an important organisational task. Following are the periodicals published by the KSSP.

1 Eureka : Children's Science Monthly for primary children Cir: 40000

2 Sastrakeralam : Science Monthly for High-School Children Cir : 15000

3 Sastragathy : Science Monthly for the grown ups Cir: 5000

4 Parishad Vartha : Monthly Bulletin for the members of KSSP:

Other publications include books for children of different age groups, for grown ups etc. All the books are well received. Print run of book varies from 2000 to 12000. Till now we have brought out about 500 titles. The main distribution channel for the books is the organisation itself. Commission allowed on books is given to the units and they utilise it for meeting their expenses.

NONFORMAL EDUCATION

Nonformal education activities of KSSP covers a wide spectrum. Some of the important ones are listed below:

1 Science Campagin : A number of classes on chosen topics are conducted from time to time. Classes are conducted not only among Parishad workers but also among the general public. Co-operation from teachers organisations, village libraries, socio-political groups etc. have helped us a lot in carrying out this programme. "Nature, Science and Society" classes of 1975, "Resources of Kerala" classes of 1976, "Cheated Consumer" classes of 1982 were some of the most successful campaigns of this sort. Each time the total number of classes varied from 10 to 15 thousand Recently we have also been campaigning against the militarization of science, multinational manipulations in the field of health, corruption in the field of education, irrational development policies etc. 1985 witnessed another mass campaign: more than 20000 classes on "The world we Live In".

2 Science Centre The Science Centre situated at Calicut is an ambitious project we have taken up. The centre is gradually being developed into an exhibition and study centre similar to Vikram Sarabhai Community Science Centre at Ahmedabad.

FORMAL EDUCATION

With full co-operation of the State Department of Education and Directorate of Public Instruction, KSSP has been undertaking a number of activities to promote science education in schools. KSSP has contributed considerably to activate school science clubs.

Eureka Talent Tests for primary and upper primary children, Sastrakeralam Quiz for high school students and Sastragathi Talent Test for college students have been well received in schools and colleges The syllabi for these tests are prescribed by KSSP. Here the attempt is to make the children realise the inter-relationship between science (in the larger sense) and life. More than 3 lakh students take part each year in these Tests.

We have also designed some courses for school teachers. The idea is to communicate effective methods of teaching science and other topics and thus make teaching a pleasurable experience both for the teachers and the taught. KSSP's enquiry into the corrupt practices in the field of education drew tremendous attention from the public as well as from various sections directly related to the field of education.

KSSP regularly alerts teachers, parents and students on the inadequacies of the present education system. A draft report on restructuring and reorienting the present day education system is being subjected to discusssions all over Kerala. KSSP believes that the education system could be changed only when the majority starts questioning its relevance, structure and utility to the society.

ENVIRONMENT BRIGADE

By reacting to quite a number of environmental issues in recent years KSSP is attempting to generate a new concern about environment among the people. Our Save Silent Valley campaign was a major step towards this direction. Campaigns against industrial pollution is another major activity of the KSSP. It played a crucial role in building up a powerful people's resistance against pollution of Chaliyar river by the Gwalior Rayons factory in

Calicut district. Similar resistance movements are gaining strength in several other areas of the State as well. Parishad has taken up serious studies about various ecological/environmental problems in different parts of the State.

Our continuous campaign and fights against deforestation in several parts of the state is gaining momentum. After two successful Vana Samrakshana Jathas (Forest protection March) and a massive signature campaign, we are presently engaged in the formation of people's resistance groups in forest areas. Results of these studies are being used for discussions and criticism among the people.

RESEARCH & DEVELOPMENT WING

Through the R & D wing KSSP is trying to develop rural oriented appropriate technological inventions in the field of environment, energy etc. With the help of Department of Science and Technology, KSSP has recently developed a high efficiency Chulha which is now extremely popular in Kerala villages. KSSP is at present attempting to develop solar cookers and a model latrine which is both cheap and culturally acceptable to the rural poor.

HEALTH BRIGADE

KSSP is very strongly questioning the relevance of the present day health delivery system which is curative oriented, individualised, institutionalized and highly costly and catering to the needs of a wealthy minority. KSSP feels that a People's Health movement alone can change the health delivery system in favour of the rural poor. KSSP is organising health camps, classes and audiovisual campaigns on an extensive scale KSSP has recently started a big campaigns to expose the anti-people and unethical policies of the multinational drug companies.

ART AND SCIENCE

Since 1980, the KSSP has been experimenting, with remarkable success and enthusiasm, on using art in its mass contact programmes. This has been in the form of a 37 day long march from one end of the state to the other end with a team of 'artists' who would visit several hundred villages performing various items like street plays, songs etc. using the medium of folk arts of Kerala. This has been found quite powerful in propagating the message of the KSSP. Also the occasion gives an intense period of contact with the people distributing KSSP publication, identifying socio-economic problems and spreading the reach of the KSSP to newer and newer areas. This programme has now become an annual feature of the KSSP activities.

In 1983 our Science and Cultural troupe undertook a trip to Delhi. Encouraged by the enthusiasm shown by our friends, we took out a Bharat Kala Morcha in May 1985. We presented our programmes at more than 100 places in 7 different States. The programme was dedicated to Victims of Bhopal Genocide.

FIGHT AGAINST MULTINATIONALS AND FOR PEACE

The Bhopal Genocide on 2-3 December, 1984 has raised a number of issues, very urgent and serious in nature. We feel that it is obligatory on the part of all like-minded groups to react seriously to these issues.

We on our part, consider that the Killer Union Carbide should be ousted from our country forthwith. Let us reaffirm our solidarity with our brothers who were choked to death at Bhopal and let us pledge to fight against the multinational blood suckers and their allies who are abusing Science and humanity.

In each country these multinational blood suckers have their collabarators. In India too we can find them. They are the very same minority, the two or three percent of the population, which grow richer and richer, impoverishing the majority. The struggle to reverse this process, to make a social revolution therefore becomes at once a struggle to defeat the collaborators of the war mongers also. Therefore economic and social boycot too become part of the slogan of' Science for Social revolution'.

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The Kerala Mathematical Association

Prof. M. J. THOMAS
Baselius College, Kottayam (President, K. M. A.)

Till 1963, there was no common forum in Kerala for all lovers of Mathematics to meet together and discuss common issues. Of course, there were teachers' Unions; but they were almost exclusively meant for the physical betterment rather than the intellectual development of the teaching community. The need for a common forum for intellectual discussions was keenly felt by lovers of Mathematics The Kerala Mathematical Association is the natural outcome of the sincere desire of the Mathematics teachers for that common forum

Mar Thoma College Tiruvella functioned as the nucleus of the association which was to be formed and Dr. C. T. John, the then professor of Mathematics in that College was the brain and energy-source which imparted the initial momentum for the onward journey. The preliminary meeting for the formation of the association was held at Tiruvella. The constitution was drafted and the association was inaugurated by the Vice Chancellor of Kerala University in 1963. It was Christened "The Kerala Mathematical Association". Dr S. Parameswaran, then Professor of Mathematics, University College Trivandrum (now retired) was the first President; and Dr. C. T John was the first Secretary of the K M. A.

In the constitution of the K. M. A., the objectives of the Association are clearly laid down. It says: "the objects of the Association shall be the promotion of Mathematics studies and research, by organising meetings for the presentation and discussion of papers, by the publication of papers, journals and books, by conducting and assisting investigations for the purpose of improving the teaching of Mathematics and by co-operating with other organisations with similar objects".

The K. M. A. cannot boast of having done full justice to the directive principles laid down in its constitution. There were limitations, of course with valid reasons, the most important of them being financial stress. But within the given conditions, it has done much for the improvement of Mathematics teaching in Kerala. Seminars were conducted occasionally and papers were presented and discussed during the seminars. Lectures were made by eminent teachers. Discussions were made for the improvement of Mathematics syllabus in the undergraduate and postgraduate level. Whenever syllabus is revised and modern topics introduced, the K M A convenes general body meeting to discuss the scope of the syllabus; lecture classes are arranged for equipping teachers with the modern ideas. The K M A has been thus doing valuable service to mathematics teachers.

Publication of journals and books still remains a wish. Financial problems have stood in the way of implementing this aspect of the objectives of the the K M A. The K. M. A. has occasionally got financial assistance from the Kerala University, Gandhiji University and All India Association of Christian Higher Education. But these assistances were limited, just sufficient to meet the expenses of some seminars.

Originally, the K. M. A. was concentrating its activities among the college teachers But later, it has tried to bring the student community also into its fold. For this purpose, competitions were held for the students in essay writing, elocution and quiz. Students have actively participated in these competitions.

Of late the K. M. A. has instituted Rolling Trophies for the colleges which produce the first rank in B Sc. and M. Sc. degree Examinations of the various Universities of Kerala.

In spite of the financial stress the K M A functions actively due to the sincere co-operation of teachers and students of Kerala. I am sure it will be benefited by its association with the Indian Mathematical society.

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